

NUR Assignment 1

Christiaan van Buchem - s1587064

April 9, 2019

Abstract

In this document an example solution template is given for the exercises in the course Numerical recipes for astrophysics.

1 Exercise 1

For this first exercise we had to write our own Poisson probability distribution function and random number generator. The output of the Poisson function can be seen in the printed text (see below) and the tests for the rng can be found in 1 and 2.

1.1 Scripts

The functions that I wrote for this exercise can be found in:

```
1 #NR_a1_1_utils.py
2 import numpy as np
3 import sys
4 import math # Only used for math.isnan() in NewRaph_rootfinder()
5
6 def poisson_distribution(mean,k):
7     fact = np.float(0)
8     for i in range(round(k)):
9         fact += np.log(k-1)
10    fact = np.exp(fact)
11    return (mean**k*np.exp(-mean))/fact
12
13 def poisson_distribution_new(mean,k):
14 #Returns probability for given k and mean
15     fact = 1
16     mag = 0
17     prev_n = 0
18     for i in range(round(k)):
19         temp = str(fact*(k-i))
20         n_zeros = len(temp)-1-prev_n
21         fact = int(temp[:10])
22         mag += n_zeros
23         prev_n = len(temp[:10])-1
24
25     a = str(mean**k)
26     b = str(np.exp(mean))
27
28     x = (float(a[:10])/1e9 * 1/float(b[:10]))/(fact/10**(prev_n-1))
29     mag_tot = -int(np.log10(float(b)))+len(a)-mag
30     return x*10**mag_tot
31 # Only works for massive numbers.....
32 #end poisson_distribution()
33
34 class rng(object):
35 # rng object that is initiated with a give seed
36     def __init__(self, seed):
37         self.state = np.int64(seed)
38
39     def LCG_gen(self):
```

```

40 #Linear Congruential generator
41 x = self.state
42 a,c,m = 2**32,1664525,1013904223
43 self.state = np.int64((a*x+c)%m)
44 #end LCG-gen()
45
46 def XOR_shift(self):
47 # XOR-shift generator
48 x = self.state
49 a1,a2,a3 = 21,35,4
50 x = x ^ x >> a1
51 x = x ^ x << a2
52 x = x ^ x >> a3
53 self.state = np.int64(x)
54 #end XOR-shift()
55
56 def rand_num(self,l,min=0,max=1):
57 # Generates 'l' random numbers between min and max
58 output = []
59 for i in range(l):
60 self.XOR_shift()
61 self.XOR_shift()
62 self.LCG_gen()
63 self.XOR_shift()
64 self.XOR_shift()
65 output.append(self.state)
66 output = np.array(output)/sys.maxsize
67 return min+(output*(max-min))
68 #end rand_num()
69 #end rng()
70
71 # — Simple supporting functions —
72
73 def min(l):
74 min = 2**64
75 for i in l:
76 if i < min:
77 min = i
78 return min
79 #end min()
80
81 def arg_min(l):
82 min = 2**64
83 arg = None
84 for i in range(len(l)):
85 if l[i] < min:
86 min = l[i]
87 arg = i
88 return arg
89 #end arg_min()
90
91 def max(l):
92 max = -2**64
93 for i in l:
94 if i > max:
95 max = i
96 return max
97 #end max()
98
99 def arg_max(l):
100 max = -2**64
101 arg = None
102 for i in range(len(l)):
103 if l[i] > max:
104 max = l[i]
105 arg = i
106 return arg
107 #end arg_max()

```

NR_a1_1_utils.py

The commands used to retrieve the desired results are given by:

```
1 #NR_a1_1_main.py
2 import numpy as np
3 import matplotlib.pyplot as plt
4 import NR_a1_1_utils as utils
5
6 seed = 42
7 print('Original seed:',seed)
8
9 #--- 1.a ---
10 # Poisson distribution
11 print('1.a:')
12 a1 = [[1,0],[5,10],[3,20],[2.6,40]]
13 print('Simple poisson distribution:')
14 for i in range(len(a1)):
15     print('P({}) with mean {}:'.format(a1[i][1],a1[i][0]),utils.poisson_distribution(a1[
16     i][0],a1[i][1]))
17 print('Large-number poisson distribution (only works for large numbers):')
18 a1 = [[101,200]]
19 for i in range(len(a1)):
20     print('P({}) with mean {}:'.format(a1[i][1],a1[i][0]),utils.poisson_distribution_new
21     (a1[i][0],a1[i][1]))
22
23 #--- 1.b ---
24 print('1.b:')
25 # RNG
26 rng = utils.rng(seed)
27 # Scatter plot
28 N = 1000
29 rand = rng.rand_num(N)
30 plt.scatter(rand[:len(rand)-1],rand[1:])
31 plt.title('Sequential number plot for {} random numbers with seed {}'.format(1000,seed))
32 plt.savefig('plots/1_b_1.png')
33
34 # Histogram
35 N = 1000000
36 rand = rng.rand_num(N)
37 plt.hist(rand,bins=20,range=(0,1))
38 plt.title('Histogram of 1,000,000 randomly generated numbers'.format(1000,seed))
39 plt.xlabel('Number of numbers in bin')
40 plt.ylabel('Number values')
41 plt.savefig('plots/1_b_2.png')
42 print('Saving Histogram and scatter plot.')
```

NR_a1_1_main.py

The result of the given script is given by:

```
1 Original seed: 42
2 1.a:
3 Simple poisson distribution:
4 P(0) with mean 1: 0.36787944117144233
5 P(10) with mean 5: 1.887133131720812e-05
6 P(20) with mean 3: 4.618166957543755e-18
7 P(40) with mean 2.6: 6.717133577841103e-49
8 Large-number poisson distribution (only works for large numbers):
9 P(200) with mean 101: 1.2695314379023172e-18
10 1.b:
11 Saving Histogram and scatter plot.
```

NR_a1_1_main.txt

2 Exercise 2

For this section of the assignment we were asked to write a variety of different functions in order to probe the given probability function $n(x)$. These will be discussed per sub-question:

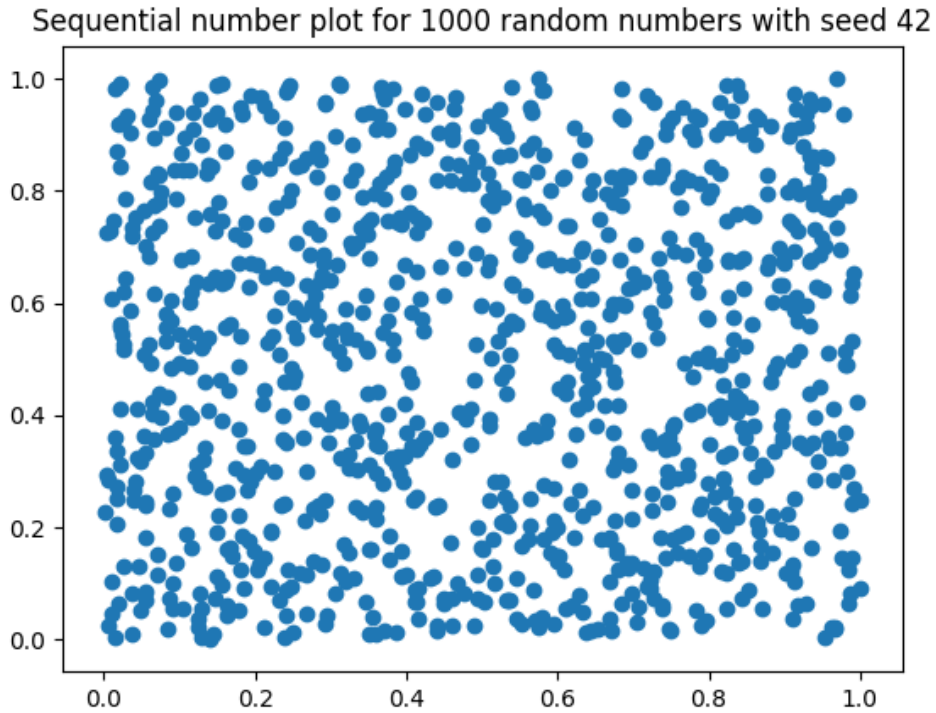


Figure 1: In this figure we can see that it appears that the random number generator is producing numbers without a certain preference.

2.1 Write a numerical integrator

In order to accomplish this task I wrote an integrator that uses Romberg's algorithm in order to numerically integrate a given function from a to b .

The output values are found in the print statement produced by the script.

2.2 Make a log-log plot and interpolate the given values

For this I used a linear-interpolator due to the fact that at first glance these values follow a linear trend in log-log space. Due to having too little time I did not manage to alter my interpolator to also work in log-space. For this reason the interpolated function systematically overshoots the fit one would expect. We can see this well in 3.

2.3 Numerically calculate $dn(x)/dx$ at $x = b$

For this task I wrote an algorithm that numerically differentiates using Ridder's method. The analytic and calculated numerical value can be found in the print statement.

2.4 Generate 3D satellite positions

In order to generate this distribution I used the rejection sampling method. The positions generated using this method can be found in the print statement.

2.5 Repeat (d) for 1000 haloes each containing 100 satellites

The histogram generated for this task can be found in 4. It appears that the generated galaxies match the distribution fairly well. It is only really lacking at the lower end of the distribution.

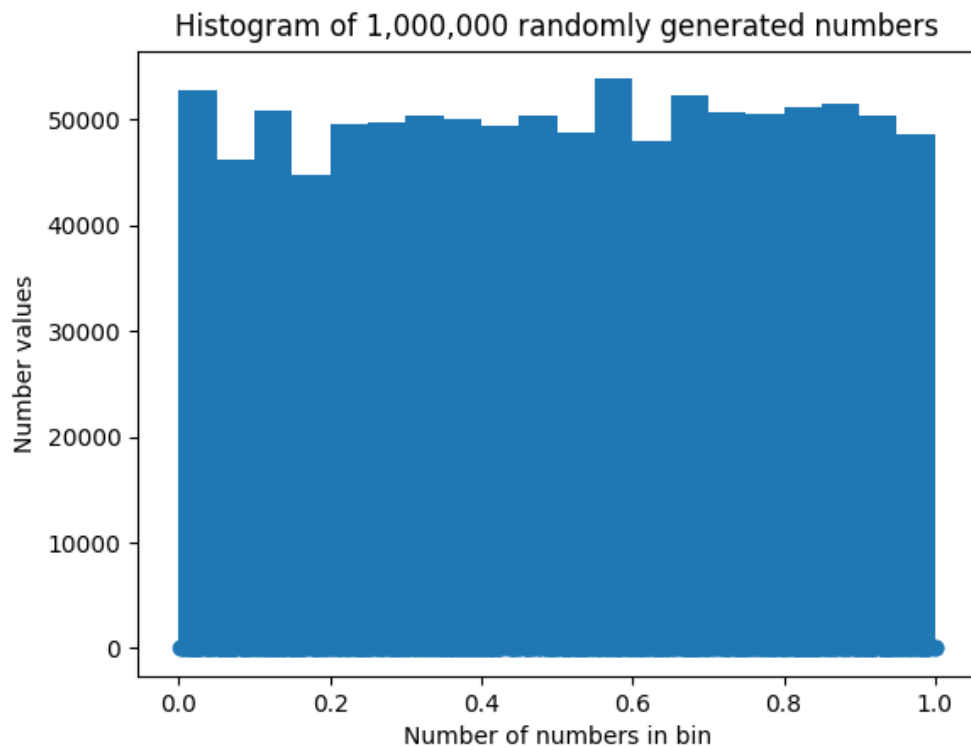


Figure 2: This histogram places the random number generator under a sharper knife, allowing us to see that there are some fluctuations between the bins. Overall it appears to be quite unbiased.

2.6 Write a root-finding algorithm

The method I used in order to find these roots is the Newton-Raphson method. This is because the false-position method and Secant method appeared not to be able to converge for this function. The values of the roots are given in the print output.

2.7 Take the bin from `e` containing the largest number of galaxies. Using sorting calculate the median, 16th and 84th percentile for this bin and output the values and plot the histogram

The calculated values for the median, 16th and 84th percentile can be found in the print statement.

The histogram produced for this task can be found in 5.

As you can (barely) see, the Poisson distribution does not match the histogram. This however is most likely due to a mistake in my Poisson distribution function.

2.8 Write an interpolator that gives values of `a` for different `a,b,c`

In order to accomplish this task I wrote a function for a trilinear-interpolator. The values I tested it with and the resulting `A` value can be found in the print statement.

2.9 Scripts

The functions that I wrote for this exercise can be found in:

```
1 #NR_a1.2_utils.py
2 import numpy as np
3 import sys
```

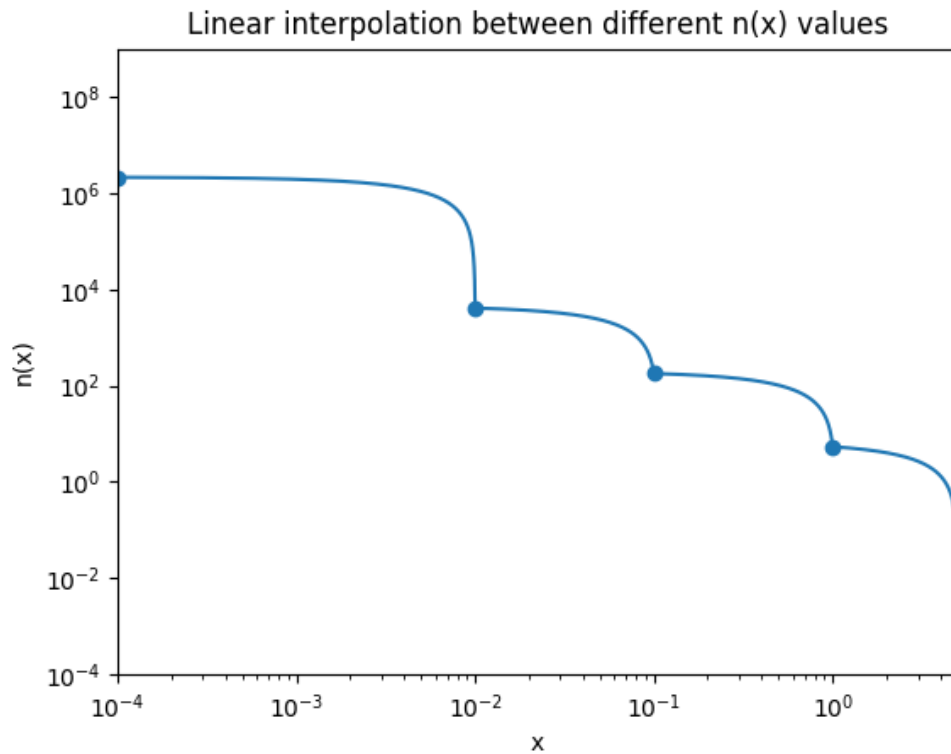


Figure 3: Here we see the way in which a linear interpolator overshoots the expected function when used in log-space.

```

4 import math # Only used for math.isnan() in NewRaph_rootfinder()
5 from NR_al_1_utils import poisson_distribution, rng, min, max, arg_max, arg_min
6
7 def central_diff(f,h,x):
8     # Calculates the central difference\n",
9     return (f(x+h)-f(x-h))/(2*h)
10 #end central_diff()
11
12 def ridders_diff(f,x):
13     # Differentiates using Ridder's method
14     m = 10
15     D = np.zeros((m,len(x)))
16     d = 2
17     h = 0.001
18     for i in range(m):
19         D_new = D
20         for j in range(i+1):
21             if j == 0:
22                 D_new[j] = central_diff(f,h,x)
23             else:
24                 D_new[j] = (d**(2*(j+1))*D[j-1]-D_new[j-1])/(d**(2*(j+1))-1)
25         D = D_new
26         h = h/d
27     return D[m-1]
28 #end ridders_diff()
29
30 def comp_trapezoid(f,a,b,n):
31     # Composite trapezoid rule used in romber_int()
32     h = 1/(2**(n-1))*(b-a)
33     sum = 0
34     for i in range(1,2**(n-1)):
35         sum += f(a+i*h)

```

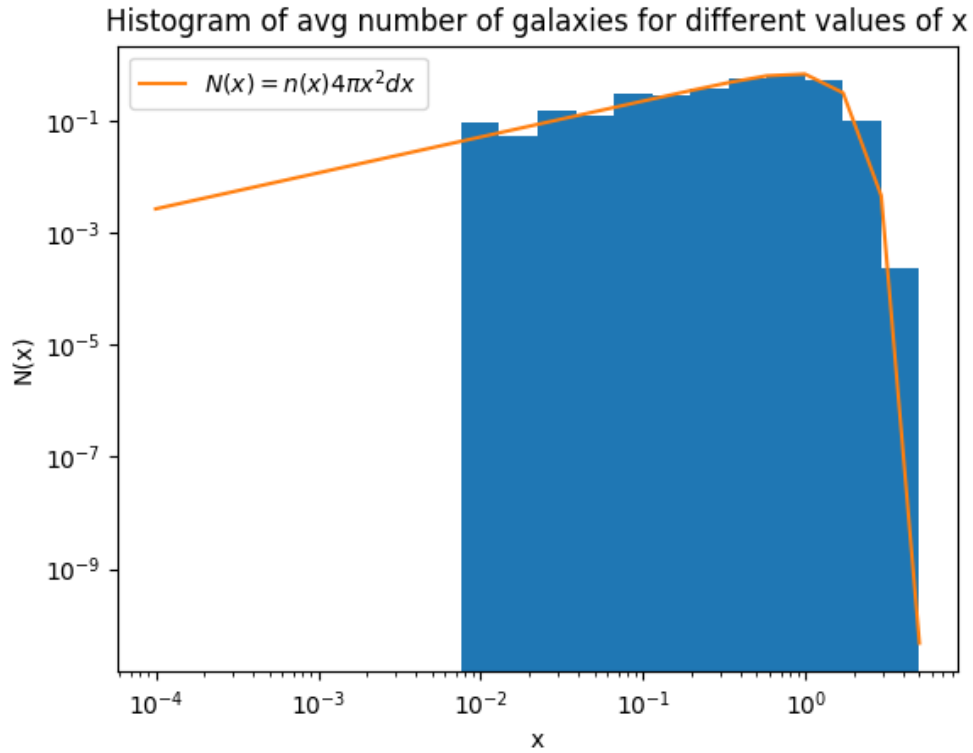


Figure 4: Histogram of number of satellites in each bin with over-plotted probability. Note the discrepancy at the lower end of the distribution.

```

36     return (h/2.)*(f(a)+2*sum+f(b))
37 #end comp_trapezoid()
38
39 def romber_int(f,a,b):
40 # Integrates from a to b up to an accuracy of 6 decimals
41     for n in range(1,10):
42         S_new = np.zeros((n))
43         S_new[0] = comp_trapezoid(f,a,b,n)
44         for j in range(2,n+1):
45             S_new[j-1] = (4**(j-1)*S_new[j-2]-S[j-2])/(4**(j-1)-1)
46         S = S_new
47         if n > 3:
48             if abs(S[-2]-S[-1]) < 1e-6:
49                 return S[-1]
50     return S[-1]
51 #end romber_int()
52
53 def interpol_lin_log(xj,yj,x,y):
54 # Linear interpolator
55     j=0
56     xj,yj,x = np.log10(xj),np.log10(yj),np.log10(x)
57     for i in range(len(x)):
58         if x[i]>xj[j]:
59             j+=1
60         if j>4:
61             return 10**y
62         y[i]=(((yj[j]-yj[j-1])/(xj[j]-xj[j-1]))*(x[i]-xj[j]))+yj[j])
63 #end interpol_lin()
64
65 def interpol_lin(xj,yj,x,y):
66 # Linear interpolator
67     j=0

```

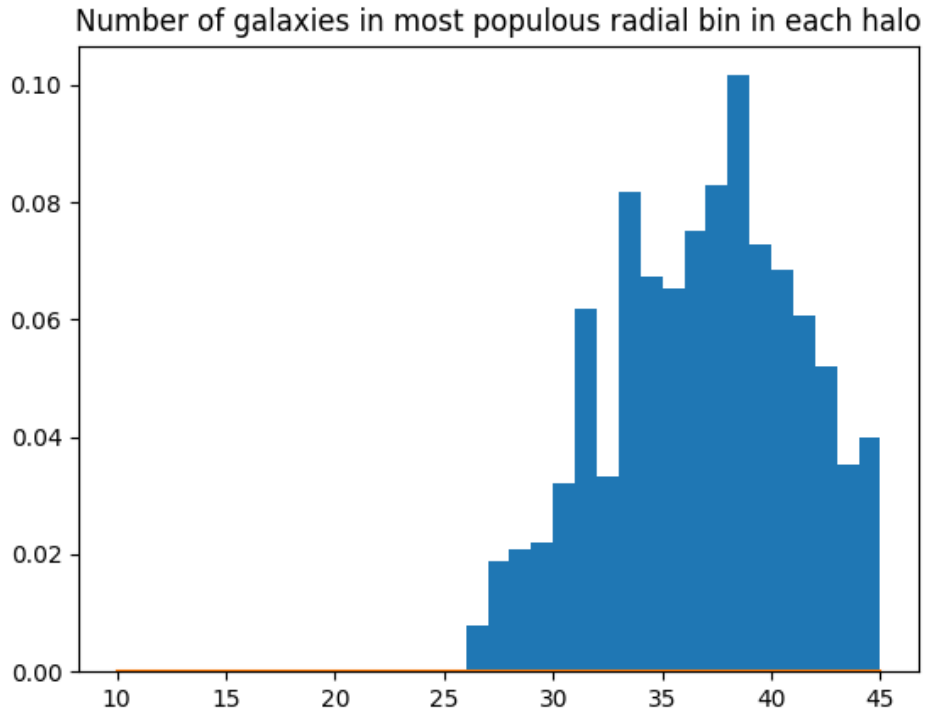


Figure 5: Number of galaxies in most populous radial bin in each halo. Note that the Poisson distribution is most likely calculated wrongly.

```

68     for i in range(len(x)):
69         if x[i] > xj[j]:
70             j += 1
71         if j > 4:
72             return y
73         y[i] = (((y[j] - y[j - 1]) / (x[j] - x[j - 1])) * (x[i] - x[j]) + y[j])
74 #end interpol_lin()
75
76 def neville_alg(x, xj, yj, i, j):
77     # Neville's Algorithm used in interpol_neville
78     if i == j:
79         return yj[i]
80     else:
81         return ((x - xj[j]) * neville_alg(x, xj, yj, i, j - 1) - (x - xj[i]) * neville_alg(x, xj, yj, i + 1, j))
82         / (xj[i] - xj[j])
83 #end neville_alg()
84
85 def interpol_neville(xj, yj, x, y):
86     # Interpolator that uses Neville's Algorithm
87     for z in range(len(x)):
88         y[z] = neville_alg(x[z], xj, yj, 0, len(xj) - 1)
89     return y
90 #end interpol_neville()
91
92 def rejection_sampler(n, p, max_x, max_y, rng):
93     # Rejection sampler that uses max_y value as g
94     sample_x = []
95     sample_y = []
96     n_acpt = 0
97     while n_acpt < n:
98         pot_x = np.float(rng.rand_num(1, max=max_x))
99         pot_y = np.float(rng.rand_num(1, max=max_y))

```



```

99         if pot_y <= p(pot_x):
100             sample_x.append(pot_x)
101             sample_y.append(pot_y)
102             n_accpt += 1
103     return sample_x, sample_y
104 #end rejection_sampler
105
106 def secant_rootfinder(f,a,b):
107     # Secant method root-finder
108     it = 0
109     while np.abs(b-a) > 0.00001:
110         it += 1
111         c = -(b-a)/float((f(b)-f(a))*f(a)+a
112         a = b
113         b = c
114     return a
115 #end secant
116
117 def falspos_rootfinder(f,a,b):
118     # False position method root-finder
119     it = 0
120     c = 0
121     while np.abs(b-a) > 0.001:
122         it += 1
123         c = -(b-a)/float((f(b)-f(a))*f(a)+a
124         print('a',a, ', b', b)
125         print('c',c)
126         if f(a)*f(c) > 0:
127             a = c
128         else:
129             b = c
130     return c, it
131 #end falspos_rootfinder()
132
133 def NewRaph_rootfinder(f,a,b,rng):
134     # Finds root in given range (a,b) for f
135     x = rng.rand_num(1,min=a,max=b)
136     x_new = sys.maxsize
137     for i in range(1000):
138         f_deriv = ridders_diff(f,np.array([x]))
139         if f_deriv == 0 or math.isnan(f_deriv):
140             x = rng.rand_num(1,min=a,max=b)
141             i = 0
142             continue
143         x_new = x - f(x)/f_deriv
144         if abs(x_new-x) < 1e-12:
145             return x_new
146         else:
147             x = x_new
148     return x
149 #end NewRaph_rootfinder()
150
151 def selection_sort(l):
152     # Ascending sorting of l using selection sort
153     sl = []
154     for i in range(len(l)):
155         min = arg_min(l)
156         sl.append(l[min])
157         l = l[:min]+l[(min+1):]
158     return sl
159 #end selection_sort()
160
161 def A_calc(a,b,c):
162     # Calculates A with given values of a,b,c
163     f = lambda x: 4*np.pi*(x**(a-1))/(b**(a-3))*np.exp(-(x/b)**c)
164     f_int = romber_int(f,0,5)
165     return 1/f_int
166 #end A_calc()
167
168 def trilinear_interpolator(al,bl,cl,Al,x,y,z):

```

```

169 # Returns an interpolated value for A1 based on a,b,c values
170 def bracket_finder(xl,x):
171     for i in range(len(xl)):
172         if xl[i] > x:
173             return xl[i-1],xl[i],i
174     print('Could not find a bucket, returning nan.')
175     return float('nan'),float('nan')
176
177 a0,a1,ai = bracket_finder(a1,x)
178 b0,b1,bi = bracket_finder(b1,y)
179 c0,c1,ci = bracket_finder(c1,z)
180
181 xd = (x-a0)/(a1-a0)
182 yd = (y-b0)/(b1-b0)
183 zd = (z-c0)/(c1-c0)
184
185 c00 = A1[ai-1][bi-1][ci-1]*(1-xd)+A1[ai][bi-1][ci-1]*xd
186 c01 = A1[ai-1][bi-1][ci]*(1-xd)+A1[ai][bi-1][ci]*xd
187 c10 = A1[ai-1][bi][ci-1]*(1-xd)+A1[ai][bi][ci-1]*xd
188 c11 = A1[ai-1][bi][ci]*(1-xd)+A1[ai][bi][ci]*xd
189
190 c0 = c00*(1-yd)+c10*yd
191 c1 = c01*(1-yd)+c11*yd
192
193 return c0*(1-zd)+c1*zd
194 #end trilinear_interpolator()

```

NR_a1.2_utils.py

The commands used to retrieve the desired results are given by:

```

1 #NR_a1.2_main.py
2 import numpy as np
3 import matplotlib.pyplot as plt
4 import NR_a1.2_utils as utils
5
6 seed = 42
7 print('Original seed:',seed)
8 rng = utils.rng(seed)
9
10 #--- 2.a ---
11 print('2.a:')
12 a = rng.rand_num(1,min=1.1,max=2.5)
13 b = rng.rand_num(1,min=0.5,max=2)
14 c = rng.rand_num(1,min=1.5,max=4)
15 f = lambda x: 4*np.pi*(x**(a-1))/(b**(a-3))*np.exp(-(x/b)**c)
16 f_int = utils.romber_int(f,0,5)
17 A = 1/f_int
18 print('A = {}; a,b,c = {},{},{},{}'.format(A,float(a),float(b),float(c)))
19
20 #--- 2.b ---
21 print('2.b:')
22 xj = [10**-4,10**-2,10**-1,1,5]
23 n_x = lambda x: A*100*(x/b)**(a-3)*np.exp(-(x/b)**c)
24 n = n_x(xj)
25 x = np.logspace(np.log10(1e-4),np.log10(5),10000)
26 y = np.zeros(10000)
27 y_lin = utils.interpol_lin(xj,n,x,y)
28 plt.scatter(xj,n)
29 plt.plot(x,y_lin)
30 plt.xlim(left=10**-4,right=5)
31 plt.ylim(bottom=1e-4,top = 1e9)
32 plt.xscale('log')
33 plt.yscale('log')
34 plt.xlabel('x')
35 plt.ylabel('n(x)')
36 plt.title('Linear interpolation between different n(x) values')
37 plt.savefig('plots/2_b.png')
38 plt.close()
39 print('Saved interpolation plot to \'plots/2_b.png\'')
40

```

```

41 #--- 2.c ---
42 print('2.c:')
43 n = lambda x: A*100*(x/b)**(a-3)*np.exp(-(x/b)**c)
44 x = b
45 dndx = utils.ridders_diff(n,np.array([b]))
46 dndx_analitic = lambda x: (A*100) * (((a-3)*(x/b)**(a-4)*np.exp(-(x/b)**c))/b - ((c*np.
47     exp(-(x/b)**c)*(x/b)**(a+c-4))/b))
48 dndx_an = dndx_analitic(x)
49 print('dn/dx at x = b: analytic = {0:.12f}; numerical = {1:.12f}'.format(float(dndx_an),
50     float(dndx)))
51 #--- 2.d ---
52 print('2.d:')
53 N = 100
54 xmax = 5
55 # Drawing random samples from n(x)
56 pn = lambda x: (n(x)*4*np.pi*x**2)/100
57 x_p = np.linspace(0,xmax,200)
58 g = np.max(pn(x_p)[1:])+0.01
59 samples = utils.rejection_sampler(N,pn,5,g,rng)
60 r = samples[0]
61 # Generating random angles:
62 phi = rng.rand_num(N,min=0,max=2*np.pi)
63 theta = np.arccos(2*rng.rand_num(N)-1)
64 x,y,z = r*np.sin(theta)*np.cos(phi),r*np.sin(theta)*np.sin(phi),r*np.cos(theta)
65 # Plotting positions for N galaxies
66 #ax = plt.figure().add_subplot(111,projection='3d')
67 #ax.scatter(x,y,z)
68 #plt.show()
69 print()
70 print('r,phi,theta:')
71 for i in range(len(r)):
72     print(r[i],phi[i],theta[i])
73
74 #--- 2.e ---
75 print('2.e:')
76 N = 100000
77 samples = utils.rejection_sampler(N,pn,5,g,rng)
78 r = samples[0]
79 bins = np.logspace(np.log10(1e-4),np.log10(xmax),num=21)
80 plt.hist(r,bins=bins,density=True)
81 plt.plot(bins,pn(bins),label = '$N(x) = n(x)4\pi x^2 dx$')
82 plt.yscale('log')
83 plt.xscale('log')
84 plt.ylabel('N(x)')
85 plt.xlabel('x')
86 plt.legend()
87 plt.title('Histogram of avg number of galaxies for different values of x')
88 plt.savefig('plots/2_e.png')
89 plt.close()
90 print('Saved histogram to \'plots/2_e.jpg\'')
91
92 #--- 2.f ---
93 print('2.f:')
94 dpndx = utils.ridders_diff(pn,x)
95 dpndx_analytic = lambda x: A*4*np.pi*(np.exp(-(x/b)**c)*(((a-1)*b**(3-a)*x**(a-2))-(c*b
96     *(2-a)*x**(a-1)*(x/b)**(c-1))))
97 dpndx_0 = float(utils.NewRaph_rootfinder(dpndx_analytic,1e-4,1,rng))
98 new_floor = float(pn(dpndx_0)/2)
99 pn_new_floor = lambda x: pn(x) - new_floor
100 root1 = float(utils.NewRaph_rootfinder(pn_new_floor,1e-4,dpndx_0,rng))
101 root2 = float(utils.NewRaph_rootfinder(pn_new_floor,dpndx_0,5,rng))
102 print('Roots:', root1,root2)
103
104 #--- 2.g ---
105 print('2.g:')
106 counts = np.zeros((len(bins)-1))
107 for i in r:

```

```

108     for j in range(len(bins)-1):
109         if i < bins[j+1] and i > bins[j]:
110             counts[j] += 1
111 r_list = []
112 r_halo_distrib = np.zeros((1000))
113
114 for i in range(len(r)):
115     if r[i] < bins[utils.argmax(counts)+1] and r[i] > bins[utils.argmax(counts)]:
116         r_list.append(r[i])
117         r_halo_distrib[i//100] += 1
118 mean = sum(r_halo_distrib)/len(r_halo_distrib)
119 halo_bins = np.linspace(10,45,36)
120 poissd = []
121
122 for i in range(len(halo_bins)):
123     poissd.append(utils.poisson_distribution(round(mean),int(halo_bins[i])))
124
125 plt.hist(r_halo_distrib,halo_bins,density=True)
126 plt.plot(halo_bins,poissd)
127 plt.title('Number of galaxies in most populous radial bin in each halo')
128 plt.savefig('plots/2-g.png')
129 print('Saved histogram to \'plots/2-g.jpg\'')
130 print('For some reason the poisson distribution does not work correctly here and I don\'
131       t know why. It does appear that the histogram follows a fairly normal distribution,
132       which is a good sign.')
131 plt.close()
132
133 sr = utils.selection_sort(r_list)
134
135 median = sr[int(len(sr)/2-0.5)]
136 p16th = sr[round(len(sr)*0.16)-1]
137 p84th = sr[round(len(sr)*0.84)-1]
138 print('Length: {}, median: {}, 16th: {}, 84th: {}'.format(len(sr),median,p16th,p84th))
139
140 # --- 2.h ---
141 print('2.h:')
142 al = np.linspace(1.1,2.5,15)
143 bl = np.linspace(0.5,2,16)
144 cl = np.linspace(1.5,4,26)
145 param = np.array((al,bl,cl))
146 Al = np.zeros([len(al),len(bl),len(cl)])
147 for i in range(len(al)):
148     for j in range(len(bl)):
149         for k in range(len(cl)):
150             Al[i][j][k] = utils.A_calc(al[i],bl[j],cl[k])
151
152 interpol = utils.trilinear_interpolator(al,bl,cl,Al,2.05,1.05,3.05)
153 print('Interpolator was tested with following values:')
154 print('For a = {}, b = {}, c = {}, the interpolator returned A = {}'.format
155       (2.05,1.05,3.05,interpol))

```

NR_a1_2_main.py

The result of the given script is given by:

```

1 Original seed: 42
2 2.a:
3 A = 0.04701878985790245; a,b,c =
4     1.6419613428029698,1.4577252811360346,2.6047059307084877
5 2.b:
6 Saved interpolation plot to 'plots/2-b.png'.
7 2.c:
8 dn/dx at x = b: analytic = -4.702159549813; numerical = -4.702159549822
9 2.d:
10 r,phi,theta:
11 0.7311141707122876 1.6028076635948272 0.2270265285598231
12 2.197278770187982 5.29883706734633 1.3425005017754366
13 1.261066210848445 0.4705410840621936 1.652797361141153
14 0.6558716361204144 5.012800547859235 2.280159240554945
15 0.7824897836202369 3.2051614706482767 1.109519113847493

```

16	0.5641889930754497	4.239148403641524	2.5313275914354216
17	0.7455003237080227	1.3378904226799089	2.07121896558909
18	0.9233498635882491	0.13554910534546938	0.8080191138718723
19	0.6646036870484072	2.593921050894136	0.6430905972730414
20	1.422587656024743	1.5936802052506487	1.1961750855480042
21	1.2151205803427914	3.3866416280089577	1.371971552370749
22	0.2683698883997805	3.983288228149664	2.34892948705019
23	0.5195498142643846	0.3023185592993231	0.20783067746454917
24	0.43194175748799657	2.0002705470795115	2.114834963001796
25	0.45944451540419623	3.701972044276426	2.720290327493936
26	0.8006572399002244	4.274590237546436	1.7464117024831116
27	0.2804255826180151	2.086678285518562	1.2565200536872243
28	1.7281651532360687	1.493229941026918	1.5682490721280593
29	0.4403162291018148	5.51406175002302	2.3134558412397968
30	0.28005365086933415	4.1667562336864306	1.2754577518288508
31	0.629885215859386	3.126371193501809	0.8823133533723011
32	1.3341331154888179	3.744806626025325	2.431634242424714
33	1.8027138385254526	3.577180243900044	1.47799705232885
34	0.2378761548099098	0.21519768812236728	2.7532126716994534
35	0.7747006558042651	3.686789510644586	1.1150685587388856
36	0.6869077696133774	3.636542606711427	1.8470806713450534
37	1.4117884436667754	3.7242596526259963	0.891581350772273
38	0.6294095410752514	1.2088053560981842	0.8448593580067348
39	1.2764752027254045	1.098289778440001	1.4188595428183999
40	1.6150927683803165	1.9199926678160373	2.8470316361511516
41	0.4186689992245968	5.637045372231429	1.9593635789694905
42	0.5461799853935555	2.2252698686054537	0.17807153021610092
43	0.6829810271722446	0.24992055211606554	1.2590866128292584
44	0.6234502914389102	1.5575463076869536	1.195224966142777
45	1.3366949341522365	3.0485171580618378	0.5212172093727148
46	0.6499529248316984	2.5940784042398093	1.453743194278108
47	0.9067285203917376	2.132532890780963	0.7257116272553009
48	1.5146136209601937	2.404549315401679	1.978017257685901
49	0.2770245026144908	6.164596891659123	1.4694682169604514
50	0.5159651931040894	2.3253515653634365	1.1861233069219161
51	0.4759216002517306	6.047620429111068	0.5387480016708217
52	2.247016406983809	0.13409749171900837	1.3807219348619766
53	1.5602946396462583	6.218389640083777	2.186858237035807
54	2.3029029642531844	3.3462652294283277	0.4412630335676338
55	0.6965374980804753	0.4498323703870266	0.43329541725053206
56	1.1409926578391123	0.7249796633728953	0.9982803668408025
57	0.6653952740755197	1.0253133385140492	1.9986788291368351
58	1.6205144185041889	1.005557374832275	0.4313321487854299
59	1.0420429483652858	3.4936712489898514	1.1563665983921778
60	1.8162715311433768	4.398841225589391	1.257522673876321
61	1.753618683902485	3.9458599495477777	2.8651583133590033
62	0.9075665701160043	5.367493156386626	2.631654291756891
63	2.196964042542822	2.597252707137583	1.724099860613247
64	1.335804466710699	0.4204979764301613	0.7175964769213862
65	0.1827132537627097	2.241282270808069	0.853186798298481
66	0.7038700495210275	2.3096897199004744	1.9112929888501538
67	1.7123198598059761	6.120340636505855	1.8682558561336253
68	2.079763440168249	2.150644043039724	2.314405830493339
69	1.8501341524498836	4.948950050730439	2.7251108593102016
70	0.8911001722393672	0.8143685684732586	2.022113824428344
71	1.091892711619008	5.552002315953939	1.7871299593017478
72	2.0542049463220273	3.7792343179439785	2.455513735502
73	1.3211167003377824	2.8219224435250907	0.8302843336903301
74	1.5889036994914583	3.862410859025583	0.20885659658253541
75	0.9993672674922676	4.641443887553411	1.2991381763462724
76	0.21591307901877496	5.32616256645649	2.161269458308147
77	1.6492796030749581	3.2963015420602892	2.239559557821826
78	1.4581203252216812	2.927113955421931	1.8842855313416325
79	2.4482548492097473	4.3877153728887714	1.532180548712544
80	1.9948482716434734	0.8685057783736273	0.5763854455089538
81	0.9218681038047252	3.987296975053835	0.5972292423329523
82	0.44154526532833743	3.2402812512358494	1.1749082354327303
83	0.18173811352986738	1.7758883998026385	1.3174654425683672
84	0.5187689966449206	4.543296053760293	1.7492149796888092
85	1.3650977926903596	0.6726655795284455	2.6194128692669856

```

86 1.4861118717435184 5.627875870996373 0.6574243816564097
87 1.5804517116615513 1.2429693794730885 1.8099719124226885
88 0.7420420489988011 5.30214916092477 0.8281478177090664
89 1.3314795740982264 2.3793285612306017 2.3801303781445413
90 0.6407129680532632 0.8940786201724139 1.7575270804295209
91 0.7322550000028955 5.290332743081566 1.6484916266608831
92 0.3504764783590363 6.087384004395324 2.8246659302385067
93 1.4659929210709874 6.282353866008897 2.402429041978465
94 1.9332396764300799 0.5667864302431423 1.5154492416588403
95 1.8020963918757016 0.6313214477879985 0.9514025960075138
96 1.1281752377936851 3.4268531372170266 2.1126890895625485
97 0.8940159908580776 4.507780842667583 1.2803535540003392
98 0.5783915184826695 6.095133351100733 1.2642369297377836
99 0.8172476257165974 4.896468153276877 1.5065904525286185
100 1.5578782882469553 2.94710820289594 0.653235189348019
101 0.7787656442861324 5.320419139190734 1.771281526346205
102 0.4080652971728931 4.270079657246644 1.8380359213790045
103 0.07337931053185985 2.6303052090296744 2.031693926313672
104 0.9549057503078782 2.189789006551835 2.1302858225822474
105 1.0740411498593938 4.667855605228215 2.1200254410634685
106 1.181490451901903 0.912168796509376 3.002947455960485
107 1.970841873281359 0.05396950164989878 2.0157468651014
108 1.415274167720679 4.574893947574355 1.2887032759180237
109 0.8888173153903209 0.7663566943066645 1.6355426458896933
110 1.4996123211828571 1.9576845334443223 2.49707290293986
111 2.e:
112 Saved histogram to 'plots/2-e.jpg'.
113 2.f:
114 Roots: 0.1987318674472368 1.6407030708001724
115 2.g:
116 Saved histogram to 'plots/2-g.jpg'.
117 For some reason the poisson distribution does not work correctly here and I don't know
    why. It does appear that the histogram follows a fairly normal distribution, which
    is a good sign.
118 Length: 37615, median: 1.2773704178216243, 16th: 1.0771942122640141, 84th:
    1.5217983937551454
119 2.h:
120 Interpolator was tested with following values:
121 For a = 2.05, b = 1.05, c = 3.05, the interpolator returned A = 0.14501036855034055.

```

NR_a1_2.main.txt

3 Exercise 3

For the third exercise we were to work with the data given to us. We also had to write down the log-likelihood corresponding to a set of random realizations of the satellite profile. This is given by:

$$\log L = N \log(A(a, b, c) + (a - 1) \left(\sum_{i=1}^{N-1} \log(x_i) - N \log(b) \right) + \sum_{i=1}^{N-1} -\left(\frac{x_i}{b}\right)^c) \quad (1)$$

3.1 Find the a,b,c that maximize this likelihood

In order to accomplish this task I decided to find the minimum of the $-\log$ likelihood. For this I wrote an algorithm that uses the Simplex (also known as the Nelder-Mead method). This function worked well for the test function that I gave it, but I did not manage to keep it within the range given for a,b,c. Given a bit more time, this function would most likely have worked. In order to test it I used the data found in *satgals_m15*.

3.2 Write an interpolator for a,b,c as a function of halo mass, or fit a function to each.

I did not manage to accomplish this task due to time constraints.

3.3 Scripts

The functions that I wrote for this exercise can be found in:

```
1 #NR_a1_3_utils.py
2 import numpy as np
3 import sys
4 from NR_a1_1_utils import poisson_distribution, rng, min, max, arg_max, arg_min
5 from NR_a1_2_utils import romber_int
6
7 def selection_sort4simplex(xs, fxs):
8     # Ascending sorting of xs and fxs based on fxs values using selection sort
9     sfxs = []
10    sxs = []
11    index = []
12    #print(fxs)
13    for i in range(len(fxs)):
14        min = arg_min(fxs)
15        sfxs.append(fxs[min])
16        sxs.append(xs[min])
17        #print(sxs, sfxs)
18        if sfxs[i] == fxs[0]:
19            fxs = fxs[(min+1):]
20            xs = xs[(min+1):]
21        elif sfxs[i] == fxs[-1]:
22            fxs = fxs[:min]
23            xs = xs[:min]
24        else:
25            #print('min', min)
26            #print('xs', xs[:min], xs[(min+1):])
27            fxs = np.append(fxs[:min], fxs[(min+1):])
28            xs = np.concatenate((xs[:min], xs[(min+1):]))
29        #print(xs, fxs)
30    return np.array(sxs), np.array(sfxs)
31 #end selection_sort4simplex()
32
33 def downhill_simplex(f, a, b, c, la = [-2**32, 2**32], lb = [-2**32, 2**32], lc =
    [-2**32, 2**32]):
34     #Optimizing function
35     alpha, beta, gamma = 1, 1, 0.3
36     rngen = rng(14)
37
38     # Generate starting points
39     xs = [[a, b, c]]
40     for i in range(3):
41         xs.append([np.round(float(a+rngen.rand_num(1)), 2), np.round(float(b+rngen.
            rand_num(1)), 2), np.round(float(c+rngen.rand_num(1)), 2)])
42         xs.append([float(a+rngen.rand_num(1)), float(b+rngen.rand_num(1)), float(c+rngen.
            rand_num(1))])
43     xs = np.array(xs)
44
45     #Centroid function
46     centroid = lambda xs: np.array([sum(xs[:, 0]), sum(xs[:, 1]), sum(xs[:, 2])]) / len(xs)
47     it = 0
48     N = 1000
49     while it < N:
50         it += 1
51         # Reorder the points from best to worst
52         fxs = f(xs)
53         xs, fxs = selection_sort4simplex(xs, fxs)
54         print('_____')
55         print('xs:', xs)
56         print('fxs:', fxs)
57         #Generate a trial point by reflection
58         c = centroid(xs)
59         print('Centroid:', c)
60         x_new = np.array([c + alpha*(c-xs[-1])])
61         print('x_new:', x_new)
62         if x_new[0][0] < la[0] or x_new[0][0] > la[1] or x_new[0][1] < lb[0] or x_new
            [0][1] > lb[1] or x_new[0][2] < lc[0] or x_new[0][2] > lc[1]:
```

```

63         fx_new = 2**32
64     else:
65         fx_new = f(x_new)
66     print('fx_new', fx_new)
67
68     if fx_new < fxs[0]: #Expansion
69         print('Expanding')
70         x_exp = x_new + beta*(x_new-c)
71         if f(x_exp) < f(x_new):
72             xs[-1] = x_exp
73         else:
74             xs[-1] = x_new
75
76     elif fx_new > fxs[-1]: #Contraction
77         fx_cont = sys.maxsize
78         wit = 0
79         while fx_cont > fxs[-1] and wit < 10:
80             wit += 1
81             print('Contracting')
82             x_cont = np.array([c + gamma*(xs[-1]-c)])
83             if x_cont[0][0] < la[0] or x_cont[0][0] > la[1] or x_cont[0][1] < lb[0]
or x_cont[0][1] > lb[1] or x_cont[0][2] < lc[0] or x_cont[0][2] > lc[1]:
84                 fx_cont = 2**32
85                 gamma = gamma*0.9
86             else:
87                 fx_cont = f(x_cont)
88             xs[-1] = x_cont
89
90     else: #Back to reflection
91         print('Back to top')
92         xs[-1] = x_new
93
94     if np.abs(fxs[0]-fxs[1]) < 1e-15:
95         print('Found minimum after {} iterations'.format(it))
96         return xs[0], fxs[0]
97     print('Reached maximum number of iterations, returning best coordinates...')
98     return xs[0], fxs[0]
99 #end downhill-simplex()
100
101 def minlog_likelyhood(abc):
102     # Returns the log_likelyhood of n(x) for given parameters
103     a,b,c = abc[:,0], abc[:,1], abc[:,2]
104
105     #Calculating A
106     A = []
107     for i in range(len(abc)):
108         f = lambda x: 4*np.pi* (x**(a[i]-1))/(b[i]**(a[i]-3)) *np.exp(-(x/b[i])**c[i])
109         A.append(1/romber_int(f,0,5))
110     print(A)
111
112     #Calculating rest of the formula
113     N = len(data)
114     logSum, expSum = 0,0
115     for i in data:
116         logSum += np.log(i)
117         expSum += -1*(i/b)**c
118     return -(N*np.log(A) + (a-1)*(logSum-N*np.log(b)) + expSum)
119 #end log_likelyhood()

```

NR_a1_3_utils.py

The commands used to retrieve the desired results are given by:

```

1 #NR_a1_3_main.py
2 import numpy as np
3 import matplotlib.pyplot as plt
4 import NR_a1_3_utils as utils
5
6 #--- 3.a ---
7 print('3.a:')
8 a,b,c = 10.,3.,3.

```



```

9 xs = [[a,b,c]]
10 f = lambda xs : (xs[:,0]-1/3)**2+(xs[:,1]-2/3)**2+(xs[:,2]-1/3)**2
11 min = utils.downhill_simplex(f,a,b,c)
12 #print(min)
13 #print('Found the minimum value {4} at a,b,c = {0},{1},{2}')(min[0][0],min[0][1],min
    [0][2],min[1])
14
15 x = utils.data_unpacker('satgals_m15.txt')
16 la,lb,lc = [1.1,2.5],[0.5,2.],[1.5,4.] #Giving a,b,c value range
17 min = utils.downhill_simplex(utils.minlog_likelyhood,1.8,1.25,2.75,la,lb,lc)
18 #print('Found the minimum value {4} at a,b,c = {0},{1},{2}')(min[0][0],min[0][1],min
    [0][2],min[1])
19 print('This almost works correctly, only thing that needs to be done is to properly
    enforce range of abc, values.')

```

NR_a1_3_main.py

The result of the given script is given by:

```

1 3.a:
2
3 xs: [[10.          3.          3.          ]
4 [10.1          3.09          3.72          ]
5 [10.33         3.06          3.4           ]
6 [10.5083468    3.2285738    3.43539571]
7 [10.30568028   3.53014945   3.81299733]
8 [10.65         3.2          3.18          ]
9 [10.8805182    3.29741216   3.99524975]]
10 fxs: [106.          112.72983333  115.06583333  119.71705813  119.7552989
11 120.9549          131.57356242]
12 Centroid: [10.39636361  3.20087649  3.50623469]
13 x_new: [[9.91220902  3.10434081  3.01721962]]
14 fx_new [104.90036025]
15 Expanding
16
17 xs: [[ 9.42805443  3.00780514  2.52820455]
18 [10.          3.          3.          ]
19 [10.1          3.09          3.72          ]
20 [10.33         3.06          3.4           ]
21 [10.5083468    3.2285738    3.43539571]
22 [10.30568028   3.53014945   3.81299733]
23 [10.65         3.2          3.18          ]]
24 fxs: [ 93.01234079 106.          112.72983333  115.06583333  119.71705813
25 119.7552989 120.9549          ]
26 Centroid: [10.18886879  3.15950406  3.2966568 ]
27 x_new: [[9.72773757  3.11900811  3.4133136 ]]
28 fx_new [103.75508802]
29 Back to top
30
31 xs: [[ 9.42805443  3.00780514  2.52820455]
32 [ 9.72773757  3.11900811  3.4133136 ]
33 [10.          3.          3.          ]
34 [10.1          3.09          3.72          ]
35 [10.33         3.06          3.4           ]
36 [10.5083468    3.2285738    3.43539571]
37 [10.30568028   3.53014945   3.81299733]]
38 fxs: [ 93.01234079 103.75508802 106.          112.72983333  115.06583333
39 119.71705813 119.7552989 ]
40 Centroid: [10.05711701  3.14793379  3.32998731]
41 x_new: [[9.80855374  2.76571812  2.84697729]]
42 fx_new [100.50422472]
43 Back to top
44
45 xs: [[ 9.42805443  3.00780514  2.52820455]
46 [ 9.80855374  2.76571812  2.84697729]
47 [ 9.72773757  3.11900811  3.4133136 ]
48 [10.          3.          3.          ]
49 [10.1          3.09          3.72          ]
50 [10.33         3.06          3.4           ]
51 [10.5083468    3.2285738    3.43539571]]
52 fxs: [ 93.01234079 100.50422472 103.75508802 106.          112.72983333

```

```

53 | 115.06583333 119.71705813]
54 | Centroid: [9.98609893 3.03872931 3.19198445]
55 | x_new: [[9.46385107 2.84888482 2.94857319]]
56 | fx_new [94.96790975]
57 | Back to top
58 |
59 | xs: [[ 9.42805443 3.00780514 2.52820455]
60 | [ 9.46385107 2.84888482 2.94857319]
61 | [ 9.80855374 2.76571812 2.84697729]
62 | [ 9.72773757 3.11900811 3.4133136 ]
63 | [10. 3. 3. ]
64 | [10.1 3.09 3.72 ]
65 | [10.33 3.06 3.4 ]]]
66 | fxs: [ 93.01234079 94.96790975 100.50422472 103.75508802 106.
67 | 112.72983333 115.06583333]
68 | Centroid: [9.83688526 2.98448803 3.12243838]
69 | x_new: [[9.34377052 2.90897605 2.84487675]]
70 | fx_new [92.52378]
71 | Expanding
72 |
73 | xs: [[ 8.85065578 2.83346408 2.56731513]
74 | [ 9.42805443 3.00780514 2.52820455]
75 | [ 9.46385107 2.84888482 2.94857319]
76 | [ 9.80855374 2.76571812 2.84697729]
77 | [ 9.72773757 3.11900811 3.4133136 ]
78 | [10. 3. 3. ]
79 | [10.1 3.09 3.72 ]]]
80 | fxs: [ 82.23046731 93.01234079 94.96790975 100.50422472 103.75508802
81 | 106. 112.72983333]
82 | Centroid: [9.62555037 2.95212575 3.00348339]
83 | x_new: [[9.15110074 2.8142515 2.28696679]]
84 | fx_new [86.18182636]
85 | Back to top
86 |
87 | xs: [[ 8.85065578 2.83346408 2.56731513]
88 | [ 9.15110074 2.8142515 2.28696679]
89 | [ 9.42805443 3.00780514 2.52820455]
90 | [ 9.46385107 2.84888482 2.94857319]
91 | [ 9.80855374 2.76571812 2.84697729]
92 | [ 9.72773757 3.11900811 3.4133136 ]
93 | [10. 3. 3. ]]]
94 | fxs: [ 82.23046731 86.18182636 93.01234079 94.96790975 100.50422472
95 | 103.75508802 106. ]
96 | Centroid: [9.48999333 2.91273311 2.79876436]
97 | x_new: [[8.97998667 2.82546622 2.59752873]]
98 | fx_new [84.55161016]
99 | Back to top
100 |
101 | xs: [[8.85065578 2.83346408 2.56731513]
102 | [8.97998667 2.82546622 2.59752873]
103 | [9.15110074 2.8142515 2.28696679]
104 | [9.42805443 3.00780514 2.52820455]
105 | [9.46385107 2.84888482 2.94857319]
106 | [9.80855374 2.76571812 2.84697729]
107 | [9.72773757 3.11900811 3.4133136 ]]]
108 | fxs: [ 82.23046731 84.55161016 86.18182636 93.01234079 94.96790975
109 | 100.50422472 103.75508802]
110 | Centroid: [9.34427714 2.88779971 2.74126847]
111 | x_new: [[8.96081671 2.65659131 2.06922333]]
112 | fx_new [81.40658366]
113 | Expanding
114 |
115 | xs: [[8.57735628 2.42538291 1.3971782 ]
116 | [8.85065578 2.83346408 2.56731513]
117 | [8.97998667 2.82546622 2.59752873]
118 | [9.15110074 2.8142515 2.28696679]
119 | [9.42805443 3.00780514 2.52820455]
120 | [9.46385107 2.84888482 2.94857319]
121 | [9.80855374 2.76571812 2.84697729]]
122 | fxs: [ 72.18876314 82.23046731 84.55161016 86.18182636 93.01234079

```

```

123 | 94.96790975 100.50422472]
124 | Centroid: [9.17993696 2.7887104 2.45324912]
125 | x_new: [[8.55132018 2.81170268 2.05952096]]
126 | fx_new [75.11621096]
127 | Back to top
128 | _____
129 | xs: [[8.57735628 2.42538291 1.3971782 ]
130 | [8.55132018 2.81170268 2.05952096]
131 | [8.85065578 2.83346408 2.56731513]
132 | [8.97998667 2.82546622 2.59752873]
133 | [9.15110074 2.8142515 2.28696679]
134 | [9.42805443 3.00780514 2.52820455]
135 | [9.46385107 2.84888482 2.94857319]]
136 | fxs: [72.18876314 75.11621096 82.23046731 84.55161016 86.18182636 93.01234079
137 | 94.96790975]
138 | Centroid: [9.00033216 2.79527962 2.34075536]
139 | x_new: [[8.53681326 2.74167442 1.73293753]]
140 | fx_new [73.56163196]
141 | Back to top
142 | _____
143 | xs: [[8.57735628 2.42538291 1.3971782 ]
144 | [8.53681326 2.74167442 1.73293753]
145 | [8.55132018 2.81170268 2.05952096]
146 | [8.85065578 2.83346408 2.56731513]
147 | [8.97998667 2.82546622 2.59752873]
148 | [9.15110074 2.8142515 2.28696679]
149 | [9.42805443 3.00780514 2.52820455]]
150 | fxs: [72.18876314 73.56163196 75.11621096 82.23046731 84.55161016 86.18182636
151 | 93.01234079]
152 | Centroid: [8.86789819 2.77996385 2.16709313]
153 | x_new: [[8.30774195 2.55212257 1.8059817 ]]
154 | fx_new [69.31482998]
155 | Expanding
156 | _____
157 | xs: [[7.74758571 2.32428128 1.44487028]
158 | [8.57735628 2.42538291 1.3971782 ]
159 | [8.53681326 2.74167442 1.73293753]
160 | [8.55132018 2.81170268 2.05952096]
161 | [8.85065578 2.83346408 2.56731513]
162 | [8.97998667 2.82546622 2.59752873]
163 | [9.15110074 2.8142515 2.28696679]]
164 | fxs: [58.95433893 72.18876314 73.56163196 75.11621096 82.23046731 84.55161016
165 | 86.18182636]
166 | Centroid: [8.62783123 2.68231759 2.01233109]
167 | x_new: [[8.10456172 2.55038367 1.73769539]]
168 | fx_new [65.91261316]
169 | Back to top
170 | _____
171 | xs: [[7.74758571 2.32428128 1.44487028]
172 | [8.10456172 2.55038367 1.73769539]
173 | [8.57735628 2.42538291 1.3971782 ]
174 | [8.53681326 2.74167442 1.73293753]
175 | [8.55132018 2.81170268 2.05952096]
176 | [8.85065578 2.83346408 2.56731513]
177 | [8.97998667 2.82546622 2.59752873]]
178 | fxs: [58.95433893 65.91261316 72.18876314 73.56163196 75.11621096 82.23046731
179 | 84.55161016]
180 | Centroid: [8.47832566 2.64462218 1.93386374]
181 | x_new: [[7.97666465 2.46377814 1.27019876]]
182 | fx_new [62.52784003]
183 | Back to top
184 | _____
185 | xs: [[7.74758571 2.32428128 1.44487028]
186 | [7.97666465 2.46377814 1.27019876]
187 | [8.10456172 2.55038367 1.73769539]
188 | [8.57735628 2.42538291 1.3971782 ]
189 | [8.53681326 2.74167442 1.73293753]
190 | [8.55132018 2.81170268 2.05952096]
191 | [8.85065578 2.83346408 2.56731513]]
192 | fxs: [58.95433893 62.52784003 65.91261316 72.18876314 73.56163196 75.11621096

```

```

193 82.23046731]
194 Centroid: [8.33499394 2.59295245 1.74424518]
195 x_new: [[7.8193321 2.35244083 0.92117523]]
196 fx_new [59.22757016]
197 Back to top
198
199 xs: [[7.74758571 2.32428128 1.44487028]
200 [7.8193321 2.35244083 0.92117523]
201 [7.97666465 2.46377814 1.27019876]
202 [8.10456172 2.55038367 1.73769539]
203 [8.57735628 2.42538291 1.3971782 ]
204 [8.53681326 2.74167442 1.73293753]
205 [8.55132018 2.81170268 2.05952096]]
206 fxs: [58.95433893 59.22757016 62.52784003 65.91261316 72.18876314 73.56163196
207 75.11621096]
208 Centroid: [8.18766198 2.52423485 1.50908234]
209 x_new: [[7.82400379 2.23676702 0.95864372]]
210 fx_new [58.96637212]
211 Back to top
212
213 xs: [[7.74758571 2.32428128 1.44487028]
214 [7.82400379 2.23676702 0.95864372]
215 [7.8193321 2.35244083 0.92117523]
216 [7.97666465 2.46377814 1.27019876]
217 [8.10456172 2.55038367 1.73769539]
218 [8.57735628 2.42538291 1.3971782 ]
219 [8.53681326 2.74167442 1.73293753]]
220 fxs: [58.95433893 58.96637212 59.22757016 62.52784003 65.91261316 72.18876314
221 73.56163196]
222 Centroid: [8.08375964 2.44210118 1.35181416]
223 x_new: [[7.63070603 2.14252794 0.97069078]]
224 fx_new [55.83603933]
225 Expanding
226
227 xs: [[7.17765242 1.8429547 0.58956741]
228 [7.74758571 2.32428128 1.44487028]
229 [7.82400379 2.23676702 0.95864372]
230 [7.8193321 2.35244083 0.92117523]
231 [7.97666465 2.46377814 1.27019876]
232 [8.10456172 2.55038367 1.73769539]
233 [8.57735628 2.42538291 1.3971782 ]]
234 fxs: [48.2940132 58.95433893 58.96637212 59.22757016 62.52784003 65.91261316
235 72.18876314]
236 Centroid: [7.88959381 2.31371265 1.18847557]
237 x_new: [[7.20183134 2.20204239 0.97977294]]
238 fx_new [49.9515276]
239 Back to top
240
241 xs: [[7.17765242 1.8429547 0.58956741]
242 [7.20183134 2.20204239 0.97977294]
243 [7.74758571 2.32428128 1.44487028]
244 [7.82400379 2.23676702 0.95864372]
245 [7.8193321 2.35244083 0.92117523]
246 [7.97666465 2.46377814 1.27019876]
247 [8.10456172 2.55038367 1.73769539]]
248 fxs: [48.2940132 49.9515276 58.95433893 58.96637212 59.22757016 62.52784003
249 65.91261316]
250 Centroid: [7.69309025 2.28180686 1.12884625]
251 x_new: [[7.28161877 2.01323005 0.51999711]]
252 fx_new [50.12674688]
253 Back to top
254
255 xs: [[7.17765242 1.8429547 0.58956741]
256 [7.20183134 2.20204239 0.97977294]
257 [7.28161877 2.01323005 0.51999711]
258 [7.74758571 2.32428128 1.44487028]
259 [7.82400379 2.23676702 0.95864372]
260 [7.8193321 2.35244083 0.92117523]
261 [7.97666465 2.46377814 1.27019876]]
262 fxs: [48.2940132 49.9515276 50.12674688 58.95433893 58.96637212 59.22757016

```

```

263 62.52784003]
264 Centroid: [7.57552697 2.20507063 0.95488935]
265 x_new: [[7.17438929 1.94636312 0.63957994]]
266 fx_new [48.53145662]
267 Back to top
268
269 xs: [[7.17765242 1.8429547 0.58956741]
270 [7.17438929 1.94636312 0.63957994]
271 [7.20183134 2.20204239 0.97977294]
272 [7.28161877 2.01323005 0.51999711]
273 [7.74758571 2.32428128 1.44487028]
274 [7.82400379 2.23676702 0.95864372]
275 [7.8193321 2.35244083 0.92117523]]
276 fxs: [48.2940132 48.53145662 49.9515276 50.12674688 58.95433893 58.96637212
277 59.22757016]
278 Centroid: [7.4609162 2.1311542 0.86480095]
279 x_new: [[7.10250031 1.90986756 0.80842666]]
280 fx_new [47.59288369]
281 Expanding
282
283 xs: [[6.74408441 1.68858093 0.75205237]
284 [7.17765242 1.8429547 0.58956741]
285 [7.17438929 1.94636312 0.63957994]
286 [7.20183134 2.20204239 0.97977294]
287 [7.28161877 2.01323005 0.51999711]
288 [7.74758571 2.32428128 1.44487028]
289 [7.82400379 2.23676702 0.95864372]]
290 fxs: [42.31736381 48.2940132 48.53145662 49.9515276 50.12674688 58.95433893
291 58.96637212]
292 Centroid: [7.30730939 2.03631707 0.84064054]
293 x_new: [[6.79061499 1.83586712 0.72263736]]
294 fx_new [43.21507373]
295 Back to top
296
297 xs: [[6.74408441 1.68858093 0.75205237]
298 [6.79061499 1.83586712 0.72263736]
299 [7.17765242 1.8429547 0.58956741]
300 [7.17438929 1.94636312 0.63957994]
301 [7.20183134 2.20204239 0.97977294]
302 [7.28161877 2.01323005 0.51999711]
303 [7.74758571 2.32428128 1.44487028]]
304 fxs: [42.31736381 43.21507373 48.2940132 48.53145662 49.9515276 50.12674688
305 58.95433893]
306 Centroid: [7.15968242 1.97904566 0.80692534]
307 x_new: [[6.57177913 1.63381003 0.16898041]]
308 fx_new [39.8805841]
309 Expanding
310
311 xs: [[ 5.98387584 1.28857441 -0.46896453]
312 [ 6.74408441 1.68858093 0.75205237]
313 [ 6.79061499 1.83586712 0.72263736]
314 [ 7.17765242 1.8429547 0.58956741]
315 [ 7.17438929 1.94636312 0.63957994]
316 [ 7.20183134 2.20204239 0.97977294]
317 [ 7.28161877 2.01323005 0.51999711]]
318 fxs: [32.95908167 42.31736381 43.21507373 48.2940132 48.53145662 49.9515276
319 50.12674688]
320 Centroid: [6.90772387 1.83108753 0.53352037]
321 x_new: [[6.53382896 1.64894501 0.54704363]]
322 fx_new [39.45668884]
323 Back to top
324
325 xs: [[ 5.98387584 1.28857441 -0.46896453]
326 [ 6.53382896 1.64894501 0.54704363]
327 [ 6.74408441 1.68858093 0.75205237]
328 [ 6.79061499 1.83586712 0.72263736]
329 [ 7.17765242 1.8429547 0.58956741]
330 [ 7.17438929 1.94636312 0.63957994]
331 [ 7.20183134 2.20204239 0.97977294]]
332 fxs: [32.95908167 39.45668884 42.31736381 43.21507373 48.2940132 48.53145662

```

```

333 49.9515276 ]
334 Centroid: [6.80089675 1.77904681 0.53738416]
335 x_new: [[6.39996216 1.35605123 0.09499538]]
336 fx_new [37.33604141]
337 Back to top
338
339 xs: [[ 5.98387584 1.28857441 -0.46896453]
340 [ 6.39996216 1.35605123 0.09499538]
341 [ 6.53382896 1.64894501 0.54704363]
342 [ 6.74408441 1.68858093 0.75205237]
343 [ 6.79061499 1.83586712 0.72263736]
344 [ 7.17765242 1.8429547 0.58956741]
345 [ 7.17438929 1.94636312 0.63957994]]
346 fxs: [32.95908167 37.33604141 39.45668884 42.31736381 43.21507373 48.2940132
347 48.53145662]
348 Centroid: [6.68634401 1.65819093 0.41098737]
349 x_new: [[6.19829873 1.37001875 0.1823948 ]]
350 fx_new [34.91530568]
351 Back to top
352
353 xs: [[ 5.98387584 1.28857441 -0.46896453]
354 [ 6.19829873 1.37001875 0.1823948 ]
355 [ 6.39996216 1.35605123 0.09499538]
356 [ 6.53382896 1.64894501 0.54704363]
357 [ 6.74408441 1.68858093 0.75205237]
358 [ 6.79061499 1.83586712 0.72263736]
359 [ 7.17765242 1.8429547 0.58956741]]
360 fxs: [32.95908167 34.91530568 37.33604141 39.45668884 42.31736381 43.21507373
361 48.2940132 ]
362 Centroid: [6.5469025 1.57585602 0.3456752 ]
363 x_new: [[5.91615258 1.30875734 0.101783 ]]
364 fx_new [31.63376677]
365 Expanding
366
367 xs: [[ 5.28540266 1.04165866 -0.14210921]
368 [ 5.98387584 1.28857441 -0.46896453]
369 [ 6.19829873 1.37001875 0.1823948 ]
370 [ 6.39996216 1.35605123 0.09499538]
371 [ 6.53382896 1.64894501 0.54704363]
372 [ 6.74408441 1.68858093 0.75205237]
373 [ 6.79061499 1.83586712 0.72263736]]
374 fxs: [24.88965527 32.95908167 34.91530568 37.33604141 39.45668884 42.31736381
375 43.21507373]
376 Centroid: [6.27658111 1.46138516 0.24114997]
377 x_new: [[ 5.76254722 1.0869032 -0.24033741]]
378 fx_new [29.98206034]
379 Back to top
380
381 xs: [[ 5.28540266 1.04165866 -0.14210921]
382 [ 5.76254722 1.0869032 -0.24033741]
383 [ 5.98387584 1.28857441 -0.46896453]
384 [ 6.19829873 1.37001875 0.1823948 ]
385 [ 6.39996216 1.35605123 0.09499538]
386 [ 6.53382896 1.64894501 0.54704363]
387 [ 6.74408441 1.68858093 0.75205237]]
388 fxs: [24.88965527 29.98206034 32.95908167 34.91530568 37.33604141 39.45668884
389 42.31736381]
390 Centroid: [6.12971428 1.35439031 0.10358215]
391 x_new: [[ 5.51534415 1.02019969 -0.54488808]]
392 fx_new [27.7494946]
393 Back to top
394
395 xs: [[ 5.28540266 1.04165866 -0.14210921]
396 [ 5.51534415 1.02019969 -0.54488808]
397 [ 5.76254722 1.0869032 -0.24033741]
398 [ 5.98387584 1.28857441 -0.46896453]
399 [ 6.19829873 1.37001875 0.1823948 ]
400 [ 6.39996216 1.35605123 0.09499538]
401 [ 6.53382896 1.64894501 0.54704363]]
402 fxs: [24.88965527 27.7494946 29.98206034 32.95908167 34.91530568 37.33604141

```

```

403 39.45668884]
404 Centroid: [ 5.95417996 1.25890728 -0.08169506]
405 x_new: [[ 5.37453096 0.86886955 -0.71043376]]
406 fx_new [26.54400929]
407 Back to top
408
409 xs: [[ 5.28540266 1.04165866 -0.14210921]
410 [ 5.37453096 0.86886955 -0.71043376]
411 [ 5.51534415 1.02019969 -0.54488808]
412 [ 5.76254722 1.0869032 -0.24033741]
413 [ 5.98387584 1.28857441 -0.46896453]
414 [ 6.19829873 1.37001875 0.1823948 ]
415 [ 6.39996216 1.35605123 0.09499538]]
416 fxs: [24.88965527 26.54400929 27.7494946 29.98206034 32.95908167 34.91530568
417 37.33604141]
418 Centroid: [ 5.78856596 1.14746793 -0.26133469]
419 x_new: [[ 5.17716976 0.93888462 -0.61766476]]
420 fx_new [24.44125132]
421 Expanding
422
423 xs: [[ 4.56577356 0.73030131 -0.97399483]
424 [ 5.28540266 1.04165866 -0.14210921]
425 [ 5.37453096 0.86886955 -0.71043376]
426 [ 5.51534415 1.02019969 -0.54488808]
427 [ 5.76254722 1.0869032 -0.24033741]
428 [ 5.98387584 1.28857441 -0.46896453]
429 [ 6.19829873 1.37001875 0.1823948 ]]]
430 fxs: [19.62670657 24.88965527 26.54400929 27.7494946 29.98206034 32.95908167
431 34.91530568]
432 Centroid: [ 5.52653902 1.05807508 -0.41404757]
433 x_new: [[ 4.85477931 0.74613142 -1.01048995]]
434 fx_new [22.25564936]
435 Back to top
436
437 xs: [[ 4.56577356 0.73030131 -0.97399483]
438 [ 4.85477931 0.74613142 -1.01048995]
439 [ 5.28540266 1.04165866 -0.14210921]
440 [ 5.37453096 0.86886955 -0.71043376]
441 [ 5.51534415 1.02019969 -0.54488808]
442 [ 5.76254722 1.0869032 -0.24033741]
443 [ 5.98387584 1.28857441 -0.46896453]]
444 fxs: [19.62670657 22.25564936 24.88965527 26.54400929 27.7494946 29.98206034
445 32.95908167]
446 Centroid: [ 5.33460767 0.96894832 -0.58445968]
447 x_new: [[ 4.68533951 0.64932223 -0.69995483]]
448 fx_new [20.00794303]
449 Back to top
450
451 xs: [[ 4.56577356 0.73030131 -0.97399483]
452 [ 4.68533951 0.64932223 -0.69995483]
453 [ 4.85477931 0.74613142 -1.01048995]
454 [ 5.28540266 1.04165866 -0.14210921]
455 [ 5.37453096 0.86886955 -0.71043376]
456 [ 5.51534415 1.02019969 -0.54488808]
457 [ 5.76254722 1.0869032 -0.24033741]]
458 fxs: [19.62670657 20.00794303 22.25564936 24.88965527 26.54400929 27.7494946
459 29.98206034]
460 Centroid: [ 5.14910248 0.87762658 -0.61745829]
461 x_new: [[ 4.53565774 0.66834997 -0.99457917]]
462 fx_new [19.42288491]
463 Expanding
464
465 xs: [[ 3.922213 0.45907335 -1.37170005]
466 [ 4.56577356 0.73030131 -0.97399483]
467 [ 4.68533951 0.64932223 -0.69995483]
468 [ 4.85477931 0.74613142 -1.01048995]
469 [ 5.28540266 1.04165866 -0.14210921]
470 [ 5.37453096 0.86886955 -0.71043376]
471 [ 5.51534415 1.02019969 -0.54488808]]
472 fxs: [15.83029112 19.62670657 20.00794303 22.25564936 24.88965527 26.54400929

```

```

473 27.7494946 ]
474 Centroid: [ 4.88619759 0.7879366 -0.77908153]
475 x_new: [[ 4.25705104 0.55567351 -1.01327498]]
476 fx_new [17.22123403]
477 Back to top
478
479 xs: [[ 3.922213 0.45907335 -1.37170005]
480 [ 4.25705104 0.55567351 -1.01327498]
481 [ 4.56577356 0.73030131 -0.97399483]
482 [ 4.68533951 0.64932223 -0.69995483]
483 [ 4.85477931 0.74613142 -1.01048995]
484 [ 5.28540266 1.04165866 -0.14210921]
485 [ 5.37453096 0.86886955 -0.71043376]]
486 fxs: [15.83029112 17.22123403 19.62670657 20.00794303 22.25564936 24.88965527
487 26.54400929]
488 Centroid: [ 4.70644144 0.72157572 -0.84599394]
489 x_new: [[ 4.03835191 0.57428189 -0.98155413]]
490 fx_new [15.46462662]
491 Expanding
492
493 xs: [[ 3.37026238 0.42698806 -1.11711432]
494 [ 3.922213 0.45907335 -1.37170005]
495 [ 4.25705104 0.55567351 -1.01327498]
496 [ 4.56577356 0.73030131 -0.97399483]
497 [ 4.68533951 0.64932223 -0.69995483]
498 [ 4.85477931 0.74613142 -1.01048995]
499 [ 5.28540266 1.04165866 -0.14210921]]
500 fxs: [11.38418225 15.83029112 17.22123403 19.62670657 20.00794303 22.25564936
501 24.88965527]
502 Centroid: [ 4.42011735 0.65844979 -0.90409117]
503 x_new: [[ 3.55483204 0.27524092 -1.66607312]]
504 fx_new [14.52889419]
505 Back to top
506
507 xs: [[ 3.37026238 0.42698806 -1.11711432]
508 [ 3.55483204 0.27524092 -1.66607312]
509 [ 3.922213 0.45907335 -1.37170005]
510 [ 4.25705104 0.55567351 -1.01327498]
511 [ 4.56577356 0.73030131 -0.97399483]
512 [ 4.68533951 0.64932223 -0.69995483]
513 [ 4.85477931 0.74613142 -1.01048995]]
514 fxs: [11.38418225 14.52889419 15.83029112 17.22123403 19.62670657 20.00794303
515 22.25564936]
516 Centroid: [ 4.17289298 0.54896154 -1.1218003 ]
517 x_new: [[ 3.49100664 0.35179167 -1.23311065]]
518 fx_new [12.52379374]
519 Back to top
520
521 xs: [[ 3.37026238 0.42698806 -1.11711432]
522 [ 3.49100664 0.35179167 -1.23311065]
523 [ 3.55483204 0.27524092 -1.66607312]
524 [ 3.922213 0.45907335 -1.37170005]
525 [ 4.25705104 0.55567351 -1.01327498]
526 [ 4.56577356 0.73030131 -0.97399483]
527 [ 4.68533951 0.64932223 -0.69995483]]
528 fxs: [11.38418225 12.52379374 14.52889419 15.83029112 17.22123403 19.62670657
529 20.00794303]
530 Centroid: [ 3.97806831 0.49262729 -1.15360325]
531 x_new: [[ 3.27079711 0.33593236 -1.60725168]]
532 fx_new [12.5039488]
533 Back to top
534
535 xs: [[ 3.37026238 0.42698806 -1.11711432]
536 [ 3.27079711 0.33593236 -1.60725168]
537 [ 3.49100664 0.35179167 -1.23311065]
538 [ 3.55483204 0.27524092 -1.66607312]
539 [ 3.922213 0.45907335 -1.37170005]
540 [ 4.25705104 0.55567351 -1.01327498]
541 [ 4.56577356 0.73030131 -0.97399483]]
542 fxs: [11.38418225 12.5039488 12.52379374 14.52889419 15.83029112 17.22123403

```



```

543 | 19.62670657]
544 | Centroid: [ 3.77599082  0.44785731 -1.28321709]
545 | x_new: [[ 2.98620809  0.16541331 -1.59243935]]
546 | fx_new [10.99759982]
547 | Expanding
548 | _____
549 | xs: [[ 2.19642535 -0.11703069 -1.90166161]
550 | [ 3.37026238  0.42698806 -1.11711432]
551 | [ 3.27079711  0.33593236 -1.60725168]
552 | [ 3.49100664  0.35179167 -1.23311065]
553 | [ 3.55483204  0.27524092 -1.66607312]
554 | [ 3.922213  0.45907335 -1.37170005]
555 | [ 4.25705104  0.55567351 -1.01327498]]
556 | fxs: [ 9.08049583 11.38418225 12.5039488 12.52379374 14.52889419 15.83029112
557 | 17.22123403]
558 | Centroid: [ 3.43751251  0.32680988 -1.41574091]
559 | x_new: [[ 2.61797398  0.09794625 -1.81820685]]
560 | fx_new [10.17215097]
561 | Back to top
562 | _____
563 | xs: [[ 2.19642535 -0.11703069 -1.90166161]
564 | [ 2.61797398  0.09794625 -1.81820685]
565 | [ 3.37026238  0.42698806 -1.11711432]
566 | [ 3.27079711  0.33593236 -1.60725168]
567 | [ 3.49100664  0.35179167 -1.23311065]
568 | [ 3.55483204  0.27524092 -1.66607312]
569 | [ 3.922213  0.45907335 -1.37170005]]
570 | fxs: [ 9.08049583 10.17215097 11.38418225 12.5039488 12.52379374 14.52889419
571 | 15.83029112]
572 | Centroid: [ 3.20335864  0.26142027 -1.53073118]
573 | x_new: [[ 2.48450429  0.0637672 -1.68976231]]
574 | fx_new [9.08394022]
575 | Back to top
576 | _____
577 | xs: [[ 2.19642535 -0.11703069 -1.90166161]
578 | [ 2.48450429  0.0637672 -1.68976231]
579 | [ 2.61797398  0.09794625 -1.81820685]
580 | [ 3.37026238  0.42698806 -1.11711432]
581 | [ 3.27079711  0.33593236 -1.60725168]
582 | [ 3.49100664  0.35179167 -1.23311065]
583 | [ 3.55483204  0.27524092 -1.66607312]]
584 | fxs: [ 9.08049583 9.08394022 10.17215097 11.38418225 12.5039488 12.52379374
585 | 14.52889419]
586 | Centroid: [ 2.99797168  0.20494797 -1.57616865]
587 | x_new: [[ 2.44111133  0.13465501 -1.48626418]]
588 | fx_new [8.03669958]
589 | Expanding
590 | _____
591 | xs: [[ 1.88425098  0.06436206 -1.3963597 ]
592 | [ 2.19642535 -0.11703069 -1.90166161]
593 | [ 2.48450429  0.0637672 -1.68976231]
594 | [ 2.61797398  0.09794625 -1.81820685]
595 | [ 3.37026238  0.42698806 -1.11711432]
596 | [ 3.27079711  0.33593236 -1.60725168]
597 | [ 3.49100664  0.35179167 -1.23311065]]
598 | fxs: [ 5.75995437 9.08049583 9.08394022 10.17215097 11.38418225 12.5039488
599 | 12.52379374]
600 | Centroid: [ 2.75931725  0.17482242 -1.53763816]
601 | x_new: [[ 2.02762785 -0.00214684 -1.84216567]]
602 | fx_new [8.05074134]
603 | Back to top
604 | _____
605 | xs: [[ 1.88425098e+00  6.43620596e-02 -1.39635970e+00]
606 | [ 2.02762785e+00 -2.14683898e-03 -1.84216567e+00]
607 | [ 2.19642535e+00 -1.17030690e-01 -1.90166161e+00]
608 | [ 2.48450429e+00  6.37671993e-02 -1.68976231e+00]
609 | [ 2.61797398e+00  9.79462535e-02 -1.81820685e+00]
610 | [ 3.37026238e+00  4.26988061e-01 -1.11711432e+00]
611 | [ 3.27079711e+00  3.35932355e-01 -1.60725168e+00]]
612 | fxs: [ 5.75995437 8.05074134 9.08049583 9.08394022 10.17215097 11.38418225

```

```

613 12.5039488 ]
614 Centroid: [ 2.55026313 0.12425977 -1.62464602]
615 x_new: [[ 1.82972916 -0.08741281 -1.64204037]]
616 fx_new [6.70993757]
617 Back to top
618
619 xs: [[ 1.88425098e+00 6.43620596e-02 -1.39635970e+00]
620 [ 1.82972916e+00 -8.74128124e-02 -1.64204037e+00]
621 [ 2.02762785e+00 -2.14683898e-03 -1.84216567e+00]
622 [ 2.19642535e+00 -1.17030690e-01 -1.90166161e+00]
623 [ 2.48450429e+00 6.37671993e-02 -1.68976231e+00]
624 [ 2.61797398e+00 9.79462535e-02 -1.81820685e+00]
625 [ 3.37026238e+00 4.26988061e-01 -1.11711432e+00]]
626 fxs: [ 5.75995437 6.70993757 8.05074134 9.08049583 9.08394022 10.17215097
627 11.38418225]
628 Centroid: [ 2.34439628 0.06378189 -1.62961583]
629 x_new: [[ 1.31853019 -0.29942428 -2.14211735]]
630 fx_new [8.03180065]
631 Back to top
632
633 xs: [[ 1.88425098e+00 6.43620596e-02 -1.39635970e+00]
634 [ 1.82972916e+00 -8.74128124e-02 -1.64204037e+00]
635 [ 1.31853019e+00 -2.99424281e-01 -2.14211735e+00]
636 [ 2.02762785e+00 -2.14683898e-03 -1.84216567e+00]
637 [ 2.19642535e+00 -1.17030690e-01 -1.90166161e+00]
638 [ 2.48450429e+00 6.37671993e-02 -1.68976231e+00]
639 [ 2.61797398e+00 9.79462535e-02 -1.81820685e+00]]
640 fxs: [ 5.75995437 6.70993757 8.03180065 8.05074134 9.08049583 9.08394022
641 10.17215097]
642 Centroid: [ 2.05129168 -0.0399913 -1.77604484]
643 x_new: [[ 1.48460939 -0.17792886 -1.73388282]]
644 fx_new [6.31216079]
645 Back to top
646
647 xs: [[ 1.88425098e+00 6.43620596e-02 -1.39635970e+00]
648 [ 1.48460939e+00 -1.77928856e-01 -1.73388282e+00]
649 [ 1.82972916e+00 -8.74128124e-02 -1.64204037e+00]
650 [ 1.31853019e+00 -2.99424281e-01 -2.14211735e+00]
651 [ 2.02762785e+00 -2.14683898e-03 -1.84216567e+00]
652 [ 2.19642535e+00 -1.17030690e-01 -1.90166161e+00]
653 [ 2.48450429e+00 6.37671993e-02 -1.68976231e+00]]
654 fxs: [5.75995437 6.31216079 6.70993757 8.03180065 8.05074134 9.08049583
655 9.08394022]
656 Centroid: [ 1.88938246 -0.07940203 -1.76399855]
657 x_new: [[ 1.29426063 -0.22257126 -1.83823479]]
658 fx_new [6.42983345]
659 Back to top
660
661 xs: [[ 1.88425098e+00 6.43620596e-02 -1.39635970e+00]
662 [ 1.48460939e+00 -1.77928856e-01 -1.73388282e+00]
663 [ 1.29426063e+00 -2.22571262e-01 -1.83823479e+00]
664 [ 1.82972916e+00 -8.74128124e-02 -1.64204037e+00]
665 [ 1.31853019e+00 -2.99424281e-01 -2.14211735e+00]
666 [ 2.02762785e+00 -2.14683898e-03 -1.84216567e+00]
667 [ 2.19642535e+00 -1.17030690e-01 -1.90166161e+00]]
668 fxs: [5.75995437 6.31216079 6.42983345 6.70993757 8.03180065 8.05074134
669 9.08049583]
670 Centroid: [ 1.71934765 -0.12030753 -1.7852089 ]
671 x_new: [[ 1.24226994 -0.12358436 -1.66875619]]
672 fx_new [5.45902491]
673 Expanding
674
675 xs: [[ 0.76519224 -0.1268612 -1.55230348]
676 [ 1.88425098 0.06436206 -1.3963597 ]
677 [ 1.48460939 -0.17792886 -1.73388282]
678 [ 1.29426063 -0.22257126 -1.83823479]
679 [ 1.82972916 -0.08741281 -1.64204037]
680 [ 1.31853019 -0.29942428 -2.14211735]
681 [ 2.02762785 -0.00214684 -1.84216567]]
682 fxs: [4.37181478 5.75995437 6.31216079 6.42983345 6.70993757 8.03180065

```

```

683 8.05074134]
684 Centroid: [ 1.51488577 -0.12171188 -1.7353006 ]
685 x_new: [[ 1.0021437 -0.24127693 -1.62843552]]
686 fx_new [5.12020592]
687 Back to top
688
689 xs: [[ 0.76519224 -0.1268612 -1.55230348]
690 [ 1.0021437 -0.24127693 -1.62843552]
691 [ 1.88425098 0.06436206 -1.3963597 ]
692 [ 1.48460939 -0.17792886 -1.73388282]
693 [ 1.29426063 -0.22257126 -1.83823479]
694 [ 1.82972916 -0.08741281 -1.64204037]
695 [ 1.31853019 -0.29942428 -2.14211735]]
696 fxs: [4.37181478 5.12020592 5.75995437 6.31216079 6.42983345 6.70993757
697 8.03180065]
698 Centroid: [ 1.36838804 -0.15587333 -1.70476772]
699 x_new: [[ 1.41824589 -0.01232237 -1.26741809]]
700 fx_new [4.20046648]
701 Expanding
702
703 xs: [[ 1.46810374 0.13122858 -0.83006846]
704 [ 0.76519224 -0.1268612 -1.55230348]
705 [ 1.0021437 -0.24127693 -1.62843552]
706 [ 1.88425098 0.06436206 -1.3963597 ]
707 [ 1.48460939 -0.17792886 -1.73388282]
708 [ 1.29426063 -0.22257126 -1.83823479]
709 [ 1.82972916 -0.08741281 -1.64204037]]
710 fxs: [2.92790154 4.37181478 5.12020592 5.75995437 6.31216079 6.42983345
711 6.70993757]
712 Centroid: [ 1.38975569 -0.09435149 -1.51733216]
713 x_new: [[ 0.94978222 -0.10129016 -1.39262396]]
714 fx_new [3.9486955]
715 Back to top
716
717 xs: [[ 1.46810374 0.13122858 -0.83006846]
718 [ 0.94978222 -0.10129016 -1.39262396]
719 [ 0.76519224 -0.1268612 -1.55230348]
720 [ 1.0021437 -0.24127693 -1.62843552]
721 [ 1.88425098 0.06436206 -1.3963597 ]
722 [ 1.48460939 -0.17792886 -1.73388282]
723 [ 1.29426063 -0.22257126 -1.83823479]]
724 fxs: [2.92790154 3.9486955 4.37181478 5.12020592 5.75995437 6.31216079
725 6.42983345]
726 Centroid: [ 1.26404898 -0.09633397 -1.48170125]
727 x_new: [[ 1.23383734 0.02990333 -1.12516771]]
728 fx_new [3.34360031]
729 Back to top
730
731 xs: [[ 1.46810374 0.13122858 -0.83006846]
732 [ 1.23383734 0.02990333 -1.12516771]
733 [ 0.94978222 -0.10129016 -1.39262396]
734 [ 0.76519224 -0.1268612 -1.55230348]
735 [ 1.0021437 -0.24127693 -1.62843552]
736 [ 1.88425098 0.06436206 -1.3963597 ]
737 [ 1.48460939 -0.17792886 -1.73388282]]
738 fxs: [2.92790154 3.34360031 3.9486955 4.37181478 5.12020592 5.75995437
739 6.31216079]
740 Centroid: [ 1.25541709 -0.06026617 -1.37983452]
741 x_new: [[ 1.02622479 0.05739652 -1.02578622]]
742 fx_new [2.69851463]
743 Expanding
744
745 xs: [[ 0.79703249 0.17505921 -0.67173792]
746 [ 1.46810374 0.13122858 -0.83006846]
747 [ 1.23383734 0.02990333 -1.12516771]
748 [ 0.94978222 -0.10129016 -1.39262396]
749 [ 0.76519224 -0.1268612 -1.55230348]
750 [ 1.0021437 -0.24127693 -1.62843552]
751 [ 1.88425098 0.06436206 -1.3963597 ]]
752 fxs: [1.46686301 2.92790154 3.34360031 3.9486955 4.37181478 5.12020592

```

```

753 5.75995437]
754 Centroid: [ 1.15719181 -0.0098393 -1.22809954]
755 x_new: [[ 0.43013265 -0.08404066 -1.05983937]]
756 fx_new [2.51386177]
757 Back to top
758
759 xs: [[ 0.79703249 0.17505921 -0.67173792]
760 [ 0.43013265 -0.08404066 -1.05983937]
761 [ 1.46810374 0.13122858 -0.83006846]
762 [ 1.23383734 0.02990333 -1.12516771]
763 [ 0.94978222 -0.10129016 -1.39262396]
764 [ 0.76519224 -0.1268612 -1.55230348]
765 [ 1.0021437 -0.24127693 -1.62843552]]
766 fxs: [1.46686301 2.51386177 2.92790154 3.34360031 3.9486955 4.37181478
767 5.12020592]
768 Centroid: [ 0.94946063 -0.03103969 -1.1800252 ]
769 x_new: [[ 0.89677755 0.17919755 -0.73161488]]
770 fx_new [1.68921023]
771 Back to top
772
773 xs: [[ 0.79703249 0.17505921 -0.67173792]
774 [ 0.89677755 0.17919755 -0.73161488]
775 [ 0.43013265 -0.08404066 -1.05983937]
776 [ 1.46810374 0.13122858 -0.83006846]
777 [ 1.23383734 0.02990333 -1.12516771]
778 [ 0.94978222 -0.10129016 -1.39262396]
779 [ 0.76519224 -0.1268612 -1.55230348]]
780 fxs: [1.46686301 1.68921023 2.51386177 2.92790154 3.34360031 3.9486955
781 4.37181478]
782 Centroid: [ 0.93440832 0.02902809 -1.05190797]
783 x_new: [[ 1.1036244 0.18491738 -0.55151245]]
784 fx_new [1.60838277]
785 Back to top
786
787 xs: [[ 0.79703249 0.17505921 -0.67173792]
788 [ 1.1036244 0.18491738 -0.55151245]
789 [ 0.89677755 0.17919755 -0.73161488]
790 [ 0.43013265 -0.08404066 -1.05983937]
791 [ 1.46810374 0.13122858 -0.83006846]
792 [ 1.23383734 0.02990333 -1.12516771]
793 [ 0.94978222 -0.10129016 -1.39262396]]
794 fxs: [1.46686301 1.60838277 1.68921023 2.51386177 2.92790154 3.34360031
795 3.9486955 ]
796 Centroid: [ 0.98275577 0.07356789 -0.90893782]
797 x_new: [[ 1.01572932 0.24842594 -0.42525168]]
798 fx_new [1.21604081]
799 Expanding
800
801 xs: [[ 1.04870287 0.423284 0.05843446]
802 [ 0.79703249 0.17505921 -0.67173792]
803 [ 1.1036244 0.18491738 -0.55151245]
804 [ 0.89677755 0.17919755 -0.73161488]
805 [ 0.43013265 -0.08404066 -1.05983937]
806 [ 1.46810374 0.13122858 -0.83006846]
807 [ 1.23383734 0.02990333 -1.12516771]]
808 fxs: [0.64655809 1.46686301 1.60838277 1.68921023 2.51386177 2.92790154
809 3.34360031]
810 Centroid: [ 0.99688729 0.14850706 -0.70164376]
811 x_new: [[ 0.75993724 0.26711078 -0.27811981]]
812 fx_new [0.71551075]
813 Back to top
814
815 xs: [[ 1.04870287 0.423284 0.05843446]
816 [ 0.75993724 0.26711078 -0.27811981]
817 [ 0.79703249 0.17505921 -0.67173792]
818 [ 1.1036244 0.18491738 -0.55151245]
819 [ 0.89677755 0.17919755 -0.73161488]
820 [ 0.43013265 -0.08404066 -1.05983937]
821 [ 1.46810374 0.13122858 -0.83006846]]
822 fxs: [0.64655809 0.71551075 1.46686301 1.60838277 1.68921023 2.51386177

```

```

823 2.92790154]
824 Centroid: [ 0.92918728 0.18239384 -0.58063692]
825 x_new: [[ 0.39027082 0.23355909 -0.33120538]]
826 fx_new [0.63243576]
827 Expanding
828
829 xs: [[-0.14864565 0.28472434 -0.08177384]
830 [ 1.04870287 0.423284 0.05843446]
831 [ 0.75993724 0.26711078 -0.27811981]
832 [ 0.79703249 0.17505921 -0.67173792]
833 [ 1.1036244 0.18491738 -0.55151245]
834 [ 0.89677755 0.17919755 -0.73161488]
835 [ 0.43013265 -0.08404066 -1.05983937]]
836 fxs: [0.55049765 0.64655809 0.71551075 1.46686301 1.60838277 1.68921023
837 2.51386177]
838 Centroid: [ 0.69822308 0.2043218 -0.47373769]
839 x_new: [[0.96631351 0.49268426 0.11236399]]
840 fx_new [0.47976123]
841 Expanding
842
843 xs: [[ 0.96631351 0.49268426 0.11236399]
844 [-0.14864565 0.28472434 -0.08177384]
845 [ 1.04870287 0.423284 0.05843446]
846 [ 0.75993724 0.26711078 -0.27811981]
847 [ 0.79703249 0.17505921 -0.67173792]
848 [ 1.1036244 0.18491738 -0.55151245]
849 [ 0.89677755 0.17919755 -0.73161488]]
850 fxs: [0.47976123 0.55049765 0.64655809 0.71551075 1.46686301 1.60838277
851 1.68921023]
852 Centroid: [ 0.77482035 0.28671108 -0.30628007]
853 x_new: [[0.65286314 0.3942246 0.11905475]]
854 fx_new [0.22223929]
855 Expanding
856
857 xs: [[ 0.53090593 0.50173813 0.54438956]
858 [ 0.96631351 0.49268426 0.11236399]
859 [-0.14864565 0.28472434 -0.08177384]
860 [ 1.04870287 0.423284 0.05843446]
861 [ 0.75993724 0.26711078 -0.27811981]
862 [ 0.79703249 0.17505921 -0.67173792]
863 [ 1.1036244 0.18491738 -0.55151245]]
864 fxs: [0.11078109 0.47976123 0.55049765 0.64655809 0.71551075 1.46686301
865 1.60838277]
866 Centroid: [ 0.72255297 0.3327883 -0.12399372]
867 x_new: [[0.34148154 0.48065922 0.30352502]]
868 fx_new [0.0355537]
869 Expanding
870
871 xs: [[ 0.34148154 0.48065922 0.30352502]
872 [ 0.53090593 0.50173813 0.54438956]
873 [ 0.96631351 0.49268426 0.11236399]
874 [-0.14864565 0.28472434 -0.08177384]
875 [ 1.04870287 0.423284 0.05843446]
876 [ 0.75993724 0.26711078 -0.27811981]
877 [ 0.79703249 0.17505921 -0.67173792]]
878 fxs: [0.0355537 0.11078109 0.47976123 0.55049765 0.64655809 0.71551075
879 1.46686301]
880 Centroid: [ 0.61367542 0.37503713 -0.00184551]
881 x_new: [[0.43031835 0.57501506 0.66804691]]
882 fx_new [0.12983929]
883 Back to top
884
885 xs: [[ 0.34148154 0.48065922 0.30352502]
886 [ 0.53090593 0.50173813 0.54438956]
887 [ 0.43031835 0.57501506 0.66804691]
888 [ 0.96631351 0.49268426 0.11236399]
889 [-0.14864565 0.28472434 -0.08177384]
890 [ 1.04870287 0.423284 0.05843446]
891 [ 0.75993724 0.26711078 -0.27811981]]
892 fxs: [0.0355537 0.11078109 0.12983929 0.47976123 0.55049765 0.64655809

```

```

893 0.71551075]
894 Centroid: [0.56128769 0.43217368 0.18955233]
895 x_new: [[0.36263813 0.59723658 0.65722447]]
896 fx_new [0.11058477]
897 Back to top
898
899 xs: [[ 0.34148154 0.48065922 0.30352502]
900 [ 0.36263813 0.59723658 0.65722447]
901 [ 0.53090593 0.50173813 0.54438956]
902 [ 0.43031835 0.57501506 0.66804691]
903 [ 0.96631351 0.49268426 0.11236399]
904 [-0.14864565 0.28472434 -0.08177384]
905 [ 1.04870287 0.423284 0.05843446]]
906 fxs: [0.0355537 0.11058477 0.11078109 0.12983929 0.47976123 0.55049765
907 0.64655809]
908 Centroid: [0.50453067 0.47933451 0.32317294]
909 x_new: [[-0.03964153 0.53538502 0.58791142]]
910 fx_new [0.22115512]
911 Back to top
912
913 xs: [[ 0.34148154 0.48065922 0.30352502]
914 [ 0.36263813 0.59723658 0.65722447]
915 [ 0.53090593 0.50173813 0.54438956]
916 [ 0.43031835 0.57501506 0.66804691]
917 [-0.03964153 0.53538502 0.58791142]
918 [ 0.96631351 0.49268426 0.11236399]
919 [-0.14864565 0.28472434 -0.08177384]]
920 fxs: [0.0355537 0.11058477 0.11078109 0.12983929 0.22115512 0.47976123
921 0.55049765]
922 Centroid: [0.3490529 0.49534894 0.3988125 ]
923 x_new: [[0.84675144 0.70597355 0.87939885]]
924 fx_new [0.56333073]
925 Contracting
926
927 xs: [[ 0.34148154 0.48065922 0.30352502]
928 [ 0.19974333 0.43216156 0.2546366 ]
929 [ 0.36263813 0.59723658 0.65722447]
930 [ 0.53090593 0.50173813 0.54438956]
931 [ 0.43031835 0.57501506 0.66804691]
932 [-0.03964153 0.53538502 0.58791142]
933 [ 0.96631351 0.49268426 0.11236399]]
934 fxs: [0.0355537 0.07903211 0.11058477 0.11078109 0.12983929 0.22115512
935 0.47976123]
936 Centroid: [0.39882275 0.5164114 0.44687114]
937 x_new: [[-0.16866801 0.54013855 0.78137828]]
938 fx_new [0.46875899]
939 Back to top
940
941 xs: [[ 0.34148154 0.48065922 0.30352502]
942 [ 0.19974333 0.43216156 0.2546366 ]
943 [ 0.36263813 0.59723658 0.65722447]
944 [ 0.53090593 0.50173813 0.54438956]
945 [ 0.43031835 0.57501506 0.66804691]
946 [-0.03964153 0.53538502 0.58791142]
947 [-0.16866801 0.54013855 0.78137828]]
948 fxs: [0.0355537 0.07903211 0.11058477 0.11078109 0.12983929 0.22115512
949 0.46875899]
950 Centroid: [0.23668253 0.52319059 0.54244461]
951 x_new: [[0.64203307 0.50624263 0.30351093]]
952 fx_new [0.12192078]
953 Back to top
954
955 xs: [[ 0.34148154 0.48065922 0.30352502]
956 [ 0.19974333 0.43216156 0.2546366 ]
957 [ 0.36263813 0.59723658 0.65722447]
958 [ 0.53090593 0.50173813 0.54438956]
959 [ 0.64203307 0.50624263 0.30351093]
960 [ 0.43031835 0.57501506 0.66804691]
961 [-0.03964153 0.53538502 0.58791142]]
962 fxs: [0.0355537 0.07903211 0.11058477 0.11078109 0.12192078 0.12983929

```

```

963 0.22115512]
964 Centroid: [0.35249697 0.51834831 0.47417784]
965 x_new: [[0.74463548 0.5013116 0.36044427]]
966 fx_new [0.19724676]
967 Back to top
968
969 xs: [[0.34148154 0.48065922 0.30352502]
970 [0.19974333 0.43216156 0.2546366 ]
971 [0.36263813 0.59723658 0.65722447]
972 [0.53090593 0.50173813 0.54438956]
973 [0.64203307 0.50624263 0.30351093]
974 [0.43031835 0.57501506 0.66804691]
975 [0.74463548 0.5013116 0.36044427]]
976 fxs: [0.0355537 0.07903211 0.11058477 0.11078109 0.12192078 0.12983929
977 0.19724676]
978 Centroid: [0.46453655 0.51348068 0.44168254]
979 x_new: [[0.18443761 0.52564976 0.5229208 ]]
980 fx_new [0.07799911]
981 Back to top
982
983 xs: [[0.34148154 0.48065922 0.30352502]
984 [0.18443761 0.52564976 0.5229208 ]
985 [0.19974333 0.43216156 0.2546366 ]
986 [0.36263813 0.59723658 0.65722447]
987 [0.53090593 0.50173813 0.54438956]
988 [0.64203307 0.50624263 0.30351093]
989 [0.43031835 0.57501506 0.66804691]]
990 fxs: [0.0355537 0.07799911 0.07903211 0.11058477 0.11078109 0.12192078
991 0.12983929]
992 Centroid: [0.38450828 0.51695756 0.46489347]
993 x_new: [[0.33869821 0.45890007 0.26174003]]
994 fx_new [0.04832134]
995 Back to top
996
997 xs: [[0.34148154 0.48065922 0.30352502]
998 [0.33869821 0.45890007 0.26174003]
999 [0.18443761 0.52564976 0.5229208 ]
1000 [0.19974333 0.43216156 0.2546366 ]
1001 [0.36263813 0.59723658 0.65722447]
1002 [0.53090593 0.50173813 0.54438956]
1003 [0.64203307 0.50624263 0.30351093]]
1004 fxs: [0.0355537 0.04832134 0.07799911 0.07903211 0.11058477 0.11078109
1005 0.12192078]
1006 Centroid: [0.37141969 0.50036971 0.40684963]
1007 x_new: [[0.10080631 0.49449678 0.51018833]]
1008 fx_new [0.11498898]
1009 Back to top
1010
1011 xs: [[0.34148154 0.48065922 0.30352502]
1012 [0.33869821 0.45890007 0.26174003]
1013 [0.18443761 0.52564976 0.5229208 ]
1014 [0.19974333 0.43216156 0.2546366 ]
1015 [0.36263813 0.59723658 0.65722447]
1016 [0.53090593 0.50173813 0.54438956]
1017 [0.10080631 0.49449678 0.51018833]]
1018 fxs: [0.0355537 0.04832134 0.07799911 0.07903211 0.11058477 0.11078109
1019 0.11498898]
1020 Centroid: [0.29410158 0.49869173 0.43637497]
1021 x_new: [[0.48739686 0.50288667 0.36256162]]
1022 fx_new [0.05141375]
1023 Back to top
1024
1025 xs: [[0.34148154 0.48065922 0.30352502]
1026 [0.33869821 0.45890007 0.26174003]
1027 [0.48739686 0.50288667 0.36256162]
1028 [0.18443761 0.52564976 0.5229208 ]
1029 [0.19974333 0.43216156 0.2546366 ]
1030 [0.36263813 0.59723658 0.65722447]
1031 [0.53090593 0.50173813 0.54438956]]
1032 fxs: [0.0355537 0.04832134 0.05141375 0.07799911 0.07903211 0.11058477

```

```

1033 0.11078109]
1034 Centroid: [0.3493288 0.49989028 0.41528544]
1035 x_new: [[0.16775167 0.49804244 0.28618132]]
1036 fx_new [0.05807473]
1037 Back to top
1038
1039 xs: [[0.34148154 0.48065922 0.30352502]
1040 [0.33869821 0.45890007 0.26174003]
1041 [0.48739686 0.50288667 0.36256162]
1042 [0.16775167 0.49804244 0.28618132]
1043 [0.18443761 0.52564976 0.5229208 ]
1044 [0.19974333 0.43216156 0.2546366 ]
1045 [0.36263813 0.59723658 0.65722447]]
1046 fxs: [0.0355537 0.04832134 0.05141375 0.05807473 0.07799911 0.07903211
1047 0.11058477]
1048 Centroid: [0.29744962 0.49936233 0.37839855]
1049 x_new: [[0.23226112 0.40148808 0.09957264]]
1050 fx_new [0.13517934]
1051 Contracting
1052
1053 xs: [[0.34148154 0.48065922 0.30352502]
1054 [0.31700617 0.52872461 0.46204633]
1055 [0.33869821 0.45890007 0.26174003]
1056 [0.48739686 0.50288667 0.36256162]
1057 [0.16775167 0.49804244 0.28618132]
1058 [0.18443761 0.52564976 0.5229208 ]
1059 [0.19974333 0.43216156 0.2546366 ]]
1060 fxs: [0.0355537 0.03586162 0.04832134 0.05141375 0.05807473 0.07799911
1061 0.07903211]
1062 Centroid: [0.29093077 0.4895749 0.35051596]
1063 x_new: [[0.38211821 0.54698825 0.44639532]]
1064 fx_new [0.0294859]
1065 Expanding
1066
1067 xs: [[0.38211821 0.54698825 0.44639532]
1068 [0.34148154 0.48065922 0.30352502]
1069 [0.31700617 0.52872461 0.46204633]
1070 [0.33869821 0.45890007 0.26174003]
1071 [0.48739686 0.50288667 0.36256162]
1072 [0.16775167 0.49804244 0.28618132]
1073 [0.18443761 0.52564976 0.5229208 ]]
1074 fxs: [0.0294859 0.0355537 0.03586162 0.04832134 0.05141375 0.05807473
1075 0.07799911]
1076 Centroid: [0.31698433 0.50597872 0.37791006]
1077 x_new: [[0.44953104 0.48630767 0.23289932]]
1078 fx_new [0.05611826]
1079 Back to top
1080
1081 xs: [[0.38211821 0.54698825 0.44639532]
1082 [0.34148154 0.48065922 0.30352502]
1083 [0.31700617 0.52872461 0.46204633]
1084 [0.33869821 0.45890007 0.26174003]
1085 [0.48739686 0.50288667 0.36256162]
1086 [0.44953104 0.48630767 0.23289932]
1087 [0.16775167 0.49804244 0.28618132]]
1088 fxs: [0.0294859 0.0355537 0.03586162 0.04832134 0.05141375 0.05611826
1089 0.05807473]
1090 Centroid: [0.35485481 0.50035842 0.33647842]
1091 x_new: [[0.54195796 0.50267439 0.38677553]]
1092 fx_new [0.07327377]
1093 Contracting
1094
1095 xs: [[0.29872387 0.49966362 0.32138929]
1096 [0.38211821 0.54698825 0.44639532]
1097 [0.34148154 0.48065922 0.30352502]
1098 [0.31700617 0.52872461 0.46204633]
1099 [0.33869821 0.45890007 0.26174003]
1100 [0.48739686 0.50288667 0.36256162]
1101 [0.44953104 0.48630767 0.23289932]]
1102 fxs: [0.02923049 0.0294859 0.0355537 0.03586162 0.04832134 0.05141375

```



```

1103 0.05611826]
1104 Centroid: [0.37356513 0.50059001 0.34150813]
1105 x_new: [[0.29759922 0.51487236 0.45011694]]
1106 fx_new [0.03795685]
1107 Back to top
1108
1109 xs: [[0.29872387 0.49966362 0.32138929]
1110 [0.38211821 0.54698825 0.44639532]
1111 [0.34148154 0.48065922 0.30352502]
1112 [0.31700617 0.52872461 0.46204633]
1113 [0.29759922 0.51487236 0.45011694]
1114 [0.33869821 0.45890007 0.26174003]
1115 [0.48739686 0.50288667 0.36256162]]
1116 fxs: [0.02923049 0.0294859 0.0355537 0.03586162 0.03795685 0.04832134
1117 0.05141375]
1118 Centroid: [0.35186058 0.50467068 0.37253922]
1119 x_new: [[0.21632431 0.5064547 0.38251683]]
1120 fx_new [0.041778]
1121 Back to top
1122
1123 xs: [[0.29872387 0.49966362 0.32138929]
1124 [0.38211821 0.54698825 0.44639532]
1125 [0.34148154 0.48065922 0.30352502]
1126 [0.31700617 0.52872461 0.46204633]
1127 [0.29759922 0.51487236 0.45011694]
1128 [0.21632431 0.5064547 0.38251683]
1129 [0.33869821 0.45890007 0.26174003]]
1130 fxs: [0.02923049 0.0294859 0.0355537 0.03586162 0.03795685 0.041778
1131 0.04832134]
1132 Centroid: [0.31313593 0.5051804 0.37538997]
1133 x_new: [[0.28757366 0.55146074 0.4890399 ]]
1134 fx_new [0.03961089]
1135 Back to top
1136
1137 xs: [[0.29872387 0.49966362 0.32138929]
1138 [0.38211821 0.54698825 0.44639532]
1139 [0.34148154 0.48065922 0.30352502]
1140 [0.31700617 0.52872461 0.46204633]
1141 [0.29759922 0.51487236 0.45011694]
1142 [0.28757366 0.55146074 0.4890399 ]
1143 [0.21632431 0.5064547 0.38251683]]
1144 fxs: [0.02923049 0.0294859 0.0355537 0.03586162 0.03795685 0.03961089
1145 0.041778 ]
1146 Centroid: [0.30583243 0.51840335 0.40786138]
1147 x_new: [[0.39534054 0.53035201 0.43320592]]
1148 fx_new [0.03240111]
1149 Back to top
1150
1151 xs: [[0.29872387 0.49966362 0.32138929]
1152 [0.38211821 0.54698825 0.44639532]
1153 [0.39534054 0.53035201 0.43320592]
1154 [0.34148154 0.48065922 0.30352502]
1155 [0.31700617 0.52872461 0.46204633]
1156 [0.29759922 0.51487236 0.45011694]
1157 [0.28757366 0.55146074 0.4890399 ]]
1158 fxs: [0.02923049 0.0294859 0.03240111 0.0355537 0.03586162 0.03795685
1159 0.03961089]
1160 Centroid: [0.33140617 0.52181726 0.41510268]
1161 x_new: [[0.37523869 0.49217378 0.34116545]]
1162 fx_new [0.03226517]
1163 Back to top
1164
1165 xs: [[0.29872387 0.49966362 0.32138929]
1166 [0.38211821 0.54698825 0.44639532]
1167 [0.37523869 0.49217378 0.34116545]
1168 [0.39534054 0.53035201 0.43320592]
1169 [0.34148154 0.48065922 0.30352502]
1170 [0.31700617 0.52872461 0.46204633]
1171 [0.29759922 0.51487236 0.45011694]]
1172 fxs: [0.02923049 0.0294859 0.03226517 0.03240111 0.0355537 0.03586162

```

```

1173 0.03795685]
1174 Centroid: [0.34392975 0.51334769 0.39397775]
1175 x_new: [[0.39026028 0.51182302 0.33783857]]
1176 fx_new [0.02723753]
1177 Expanding
1178
1179 xs: [[0.39026028 0.51182302 0.33783857]
1180 [0.29872387 0.49966362 0.32138929]
1181 [0.38211821 0.54698825 0.44639532]
1182 [0.37523869 0.49217378 0.34116545]
1183 [0.39534054 0.53035201 0.43320592]
1184 [0.34148154 0.48065922 0.30352502]
1185 [0.31700617 0.52872461 0.46204633]]
1186 fxs: [0.02723753 0.02923049 0.0294859 0.03226517 0.03240111 0.0355537
1187 0.03586162]
1188 Centroid: [0.35716704 0.51291207 0.37793799]
1189 x_new: [[0.39732791 0.49709954 0.29382965]]
1190 fx_new [0.03440886]
1191 Back to top
1192
1193 xs: [[0.39026028 0.51182302 0.33783857]
1194 [0.29872387 0.49966362 0.32138929]
1195 [0.38211821 0.54698825 0.44639532]
1196 [0.37523869 0.49217378 0.34116545]
1197 [0.39534054 0.53035201 0.43320592]
1198 [0.39732791 0.49709954 0.29382965]
1199 [0.34148154 0.48065922 0.30352502]]
1200 fxs: [0.02723753 0.02923049 0.0294859 0.03226517 0.03240111 0.03440886
1201 0.0355537 ]
1202 Centroid: [0.36864158 0.50839421 0.35390703]
1203 x_new: [[0.39580162 0.5361292 0.40428904]]
1204 fx_new [0.02597703]
1205 Expanding
1206
1207 xs: [[0.39580162 0.5361292 0.40428904]
1208 [0.39026028 0.51182302 0.33783857]
1209 [0.29872387 0.49966362 0.32138929]
1210 [0.38211821 0.54698825 0.44639532]
1211 [0.37523869 0.49217378 0.34116545]
1212 [0.39534054 0.53035201 0.43320592]
1213 [0.39732791 0.49709954 0.29382965]]
1214 fxs: [0.02597703 0.02723753 0.02923049 0.0294859 0.03226517 0.03240111
1215 0.03440886]
1216 Centroid: [0.37640159 0.51631849 0.36830189]
1217 x_new: [[0.35547526 0.53553744 0.44277414]]
1218 fx_new [0.02966243]
1219 Back to top
1220
1221 xs: [[0.39580162 0.5361292 0.40428904]
1222 [0.39026028 0.51182302 0.33783857]
1223 [0.29872387 0.49966362 0.32138929]
1224 [0.38211821 0.54698825 0.44639532]
1225 [0.35547526 0.53553744 0.44277414]
1226 [0.37523869 0.49217378 0.34116545]
1227 [0.39534054 0.53035201 0.43320592]]
1228 fxs: [0.02597703 0.02723753 0.02923049 0.0294859 0.02966243 0.03226517
1229 0.03240111]
1230 Centroid: [0.37042264 0.52180962 0.38957968]
1231 x_new: [[0.34550474 0.51326722 0.34595343]]
1232 fx_new [0.0238388]
1233 Expanding
1234
1235 xs: [[0.34550474 0.51326722 0.34595343]
1236 [0.39580162 0.5361292 0.40428904]
1237 [0.39026028 0.51182302 0.33783857]
1238 [0.29872387 0.49966362 0.32138929]
1239 [0.38211821 0.54698825 0.44639532]
1240 [0.35547526 0.53553744 0.44277414]
1241 [0.37523869 0.49217378 0.34116545]]
1242 fxs: [0.0238388 0.02597703 0.02723753 0.02923049 0.0294859 0.02966243

```

```

1243 0.03226517]
1244 Centroid: [0.36330324 0.51936893 0.37711503]
1245 x_new: [[0.35136779 0.54656409 0.41306462]]
1246 fx_new [0.02110695]
1247 Expanding
1248
1249 xs: [[0.35136779 0.54656409 0.41306462]
1250 [0.34550474 0.51326722 0.34595343]
1251 [0.39580162 0.5361292 0.40428904]
1252 [0.39026028 0.51182302 0.33783857]
1253 [0.29872387 0.49966362 0.32138929]
1254 [0.38211821 0.54698825 0.44639532]
1255 [0.35547526 0.53553744 0.44277414]]
1256 fxs: [0.02110695 0.0238388 0.02597703 0.02723753 0.02923049 0.0294859
1257 0.02966243]
1258 Centroid: [0.35989311 0.52713898 0.38738634]
1259 x_new: [[0.36431095 0.51874052 0.33199855]]
1260 fx_new [0.02284354]
1261 Back to top
1262
1263 xs: [[0.35136779 0.54656409 0.41306462]
1264 [0.36431095 0.51874052 0.33199855]
1265 [0.34550474 0.51326722 0.34595343]
1266 [0.39580162 0.5361292 0.40428904]
1267 [0.39026028 0.51182302 0.33783857]
1268 [0.29872387 0.49966362 0.32138929]
1269 [0.38211821 0.54698825 0.44639532]]
1270 fxs: [0.02110695 0.02284354 0.0238388 0.02597703 0.02723753 0.02923049
1271 0.0294859 ]
1272 Centroid: [0.36115535 0.52473942 0.37156126]
1273 x_new: [[0.34019249 0.50249059 0.2967272 ]]
1274 fx_new [0.02834084]
1275 Back to top
1276
1277 xs: [[0.35136779 0.54656409 0.41306462]
1278 [0.36431095 0.51874052 0.33199855]
1279 [0.34550474 0.51326722 0.34595343]
1280 [0.39580162 0.5361292 0.40428904]
1281 [0.39026028 0.51182302 0.33783857]
1282 [0.34019249 0.50249059 0.2967272 ]
1283 [0.29872387 0.49966362 0.32138929]]
1284 fxs: [0.02110695 0.02284354 0.0238388 0.02597703 0.02723753 0.02834084
1285 0.02923049]
1286 Centroid: [0.35516596 0.51838261 0.3501801 ]
1287 x_new: [[0.41160805 0.53710159 0.37897091]]
1288 fx_new [0.02499683]
1289 Back to top
1290
1291 xs: [[0.35136779 0.54656409 0.41306462]
1292 [0.36431095 0.51874052 0.33199855]
1293 [0.34550474 0.51326722 0.34595343]
1294 [0.41160805 0.53710159 0.37897091]
1295 [0.39580162 0.5361292 0.40428904]
1296 [0.39026028 0.51182302 0.33783857]
1297 [0.34019249 0.50249059 0.2967272 ]]
1298 fxs: [0.02110695 0.02284354 0.0238388 0.02499683 0.02597703 0.02723753
1299 0.02834084]
1300 Centroid: [0.37129227 0.52373089 0.35840604]
1301 x_new: [[0.40239206 0.54497119 0.42008489]]
1302 fx_new [0.02710473]
1303 Back to top
1304
1305 xs: [[0.35136779 0.54656409 0.41306462]
1306 [0.36431095 0.51874052 0.33199855]
1307 [0.34550474 0.51326722 0.34595343]
1308 [0.41160805 0.53710159 0.37897091]
1309 [0.39580162 0.5361292 0.40428904]
1310 [0.40239206 0.54497119 0.42008489]
1311 [0.39026028 0.51182302 0.33783857]]
1312 fxs: [0.02110695 0.02284354 0.0238388 0.02499683 0.02597703 0.02710473

```

```

1313 0.02723753]
1314 Centroid: [0.38017793 0.52979955 0.37602857]
1315 x_new: [[0.37009557 0.54777607 0.41421858]]
1316 fx_new [0.02202886]
1317 Back to top
1318
1319 xs: [[0.35136779 0.54656409 0.41306462]
1320 [0.37009557 0.54777607 0.41421858]
1321 [0.36431095 0.51874052 0.33199855]
1322 [0.34550474 0.51326722 0.34595343]
1323 [0.41160805 0.53710159 0.37897091]
1324 [0.39580162 0.5361292 0.40428904]
1325 [0.40239206 0.54497119 0.42008489]]
1326 fxs: [0.02110695 0.02202886 0.02284354 0.0238388 0.02499683 0.02597703
1327 0.02710473]
1328 Centroid: [0.37729725 0.5349357 0.38694 ]
1329 x_new: [[0.35220245 0.5249002 0.35379511]]
1330 fx_new [0.02087246]
1331 Expanding
1332
1333 xs: [[0.35220245 0.5249002 0.35379511]
1334 [0.35136779 0.54656409 0.41306462]
1335 [0.37009557 0.54777607 0.41421858]
1336 [0.36431095 0.51874052 0.33199855]
1337 [0.34550474 0.51326722 0.34595343]
1338 [0.41160805 0.53710159 0.37897091]
1339 [0.39580162 0.5361292 0.40428904]]
1340 fxs: [0.02087246 0.02110695 0.02202886 0.02284354 0.0238388 0.02499683
1341 0.02597703]
1342 Centroid: [0.37012731 0.53206841 0.37747003]
1343 x_new: [[0.344453 0.52800763 0.35065103]]
1344 fx_new [0.01964988]
1345 Expanding
1346
1347 xs: [[0.344453 0.52800763 0.35065103]
1348 [0.35220245 0.5249002 0.35379511]
1349 [0.35136779 0.54656409 0.41306462]
1350 [0.37009557 0.54777607 0.41421858]
1351 [0.36431095 0.51874052 0.33199855]
1352 [0.34550474 0.51326722 0.34595343]
1353 [0.41160805 0.53710159 0.37897091]]
1354 fxs: [0.01964988 0.02087246 0.02110695 0.02202886 0.02284354 0.0238388
1355 0.02499683]
1356 Centroid: [0.36279179 0.53090819 0.36980746]
1357 x_new: [[0.31397554 0.52471478 0.36064401]]
1358 fx_new [0.02127093]
1359 Back to top
1360
1361 xs: [[0.344453 0.52800763 0.35065103]
1362 [0.35220245 0.5249002 0.35379511]
1363 [0.35136779 0.54656409 0.41306462]
1364 [0.31397554 0.52471478 0.36064401]
1365 [0.37009557 0.54777607 0.41421858]
1366 [0.36431095 0.51874052 0.33199855]
1367 [0.34550474 0.51326722 0.34595343]]
1368 fxs: [0.01964988 0.02087246 0.02110695 0.02127093 0.02202886 0.02284354
1369 0.0238388 ]
1370 Centroid: [0.34884429 0.52913864 0.36718933]
1371 x_new: [[0.35218385 0.54501007 0.38842524]]
1372 fx_new [0.01819079]
1373 Expanding
1374
1375 xs: [[0.3555234 0.56088149 0.40966114]
1376 [0.344453 0.52800763 0.35065103]
1377 [0.35220245 0.5249002 0.35379511]
1378 [0.35136779 0.54656409 0.41306462]
1379 [0.31397554 0.52471478 0.36064401]
1380 [0.37009557 0.54777607 0.41421858]
1381 [0.36431095 0.51874052 0.33199855]]
1382 fxs: [0.01750884 0.01964988 0.02087246 0.02110695 0.02127093 0.02202886

```

```

1383 0.02284354]
1384 Centroid: [0.35027553 0.53594068 0.37629043]
1385 x_new: [[0.3362401 0.55314085 0.42058232]]
1386 fx_new [0.02050895]
1387 Back to top
1388
1389 xs: [[0.3555234 0.56088149 0.40966114]
1390 [0.344453 0.52800763 0.35065103]
1391 [0.3362401 0.55314085 0.42058232]
1392 [0.35220245 0.5249002 0.35379511]
1393 [0.35136779 0.54656409 0.41306462]
1394 [0.31397554 0.52471478 0.36064401]
1395 [0.37009557 0.54777607 0.41421858]]
1396 fxs: [0.01750884 0.01964988 0.02050895 0.02087246 0.02110695 0.02127093
1397 0.02202886]
1398 Centroid: [0.34626541 0.54085501 0.38894526]
1399 x_new: [[0.32243524 0.53393396 0.36367194]]
1400 fx_new [0.01865717]
1401 Back to top
1402
1403 xs: [[0.3555234 0.56088149 0.40966114]
1404 [0.32243524 0.53393396 0.36367194]
1405 [0.344453 0.52800763 0.35065103]
1406 [0.3362401 0.55314085 0.42058232]
1407 [0.35220245 0.5249002 0.35379511]
1408 [0.35136779 0.54656409 0.41306462]
1409 [0.31397554 0.52471478 0.36064401]]
1410 fxs: [0.01750884 0.01865717 0.01964988 0.02050895 0.02087246 0.02110695
1411 0.02127093]
1412 Centroid: [0.33945679 0.53887757 0.38172431]
1413 x_new: [[0.36493804 0.55304036 0.4028046 ]]
1414 fx_new [0.01873605]
1415 Back to top
1416
1417 xs: [[0.3555234 0.56088149 0.40966114]
1418 [0.32243524 0.53393396 0.36367194]
1419 [0.36493804 0.55304036 0.4028046 ]
1420 [0.344453 0.52800763 0.35065103]
1421 [0.3362401 0.55314085 0.42058232]
1422 [0.35220245 0.5249002 0.35379511]
1423 [0.35136779 0.54656409 0.41306462]]
1424 fxs: [0.01750884 0.01865717 0.01873605 0.01964988 0.02050895 0.02087246
1425 0.02110695]
1426 Centroid: [0.34673715 0.54292408 0.38774725]
1427 x_new: [[0.34210651 0.53928408 0.36242988]]
1428 fx_new [0.0171499]
1429 Expanding
1430
1431 xs: [[0.34210651 0.53928408 0.36242988]
1432 [0.3555234 0.56088149 0.40966114]
1433 [0.32243524 0.53393396 0.36367194]
1434 [0.36493804 0.55304036 0.4028046 ]
1435 [0.344453 0.52800763 0.35065103]
1436 [0.3362401 0.55314085 0.42058232]
1437 [0.35220245 0.5249002 0.35379511]]
1438 fxs: [0.0171499 0.01750884 0.01865717 0.01873605 0.01964988 0.02050895
1439 0.02087246]
1440 Centroid: [0.34541411 0.54188408 0.38051372]
1441 x_new: [[0.33862576 0.55886796 0.40723232]]
1442 fx_new [0.01710963]
1443 Expanding
1444
1445 xs: [[0.33862576 0.55886796 0.40723232]
1446 [0.34210651 0.53928408 0.36242988]
1447 [0.3555234 0.56088149 0.40966114]
1448 [0.32243524 0.53393396 0.36367194]
1449 [0.36493804 0.55304036 0.4028046 ]
1450 [0.344453 0.52800763 0.35065103]
1451 [0.3362401 0.55314085 0.42058232]]
1452 fxs: [0.01710963 0.0171499 0.01750884 0.01865717 0.01873605 0.01964988

```

```

1453 0.02050895]
1454 Centroid: [0.34347458 0.54673662 0.3881476 ]
1455 x_new: [[0.35070906 0.54033239 0.35571289]]
1456 fx_new [0.01676311]
1457 Expanding
1458
1459 xs: [[0.35070906 0.54033239 0.35571289]
1460 [0.33862576 0.55886796 0.40723232]
1461 [0.34210651 0.53928408 0.36242988]
1462 [0.3555234 0.56088149 0.40966114]
1463 [0.32243524 0.53393396 0.36367194]
1464 [0.36493804 0.55304036 0.4028046 ]
1465 [0.344453 0.52800763 0.35065103]]
1466 fxs: [0.01676311 0.01710963 0.0171499 0.01750884 0.01865717 0.01873605
1467 0.01964988]
1468 Centroid: [0.34554157 0.54490684 0.37888054]
1469 x_new: [[0.34663015 0.56180605 0.40711006]]
1470 fx_new [0.01661556]
1471 Expanding
1472
1473 xs: [[0.34663015 0.56180605 0.40711006]
1474 [0.35070906 0.54033239 0.35571289]
1475 [0.33862576 0.55886796 0.40723232]
1476 [0.34210651 0.53928408 0.36242988]
1477 [0.3555234 0.56088149 0.40966114]
1478 [0.32243524 0.53393396 0.36367194]
1479 [0.36493804 0.55304036 0.4028046 ]]
1480 fxs: [0.01661556 0.01676311 0.01710963 0.0171499 0.01750884 0.01865717
1481 0.01873605]
1482 Centroid: [0.34585259 0.54973518 0.38694612]
1483 x_new: [[0.32676715 0.54643001 0.37108763]]
1484 fx_new [0.01592536]
1485 Expanding
1486
1487 xs: [[0.32676715 0.54643001 0.37108763]
1488 [0.34663015 0.56180605 0.40711006]
1489 [0.35070906 0.54033239 0.35571289]
1490 [0.33862576 0.55886796 0.40723232]
1491 [0.34210651 0.53928408 0.36242988]
1492 [0.3555234 0.56088149 0.40966114]
1493 [0.32243524 0.53393396 0.36367194]]
1494 fxs: [0.01592536 0.01661556 0.01676311 0.01710963 0.0171499 0.01750884
1495 0.01865717]
1496 Centroid: [0.34039961 0.54879085 0.38241512]
1497 x_new: [[0.35836398 0.56364773 0.40115831]]
1498 fx_new [0.01583966]
1499 Expanding
1500
1501 xs: [[0.35836398 0.56364773 0.40115831]
1502 [0.32676715 0.54643001 0.37108763]
1503 [0.34663015 0.56180605 0.40711006]
1504 [0.35070906 0.54033239 0.35571289]
1505 [0.33862576 0.55886796 0.40723232]
1506 [0.34210651 0.53928408 0.36242988]
1507 [0.3555234 0.56088149 0.40966114]]
1508 fxs: [0.01583966 0.01592536 0.01661556 0.01676311 0.01710963 0.0171499
1509 0.01750884]
1510 Centroid: [0.34553229 0.55303567 0.38777032]
1511 x_new: [[0.33554117 0.54518985 0.3658795 ]]
1512 fx_new [0.01582074]
1513 Expanding
1514
1515 xs: [[0.33554117 0.54518985 0.3658795 ]
1516 [0.35836398 0.56364773 0.40115831]
1517 [0.32676715 0.54643001 0.37108763]
1518 [0.34663015 0.56180605 0.40711006]
1519 [0.35070906 0.54033239 0.35571289]
1520 [0.33862576 0.55886796 0.40723232]
1521 [0.34210651 0.53928408 0.36242988]]
1522 fxs: [0.01582074 0.01583966 0.01592536 0.01661556 0.01676311 0.01710963

```

```

1523 0.0171499 ]
1524 Centroid: [0.34267768 0.55079401 0.3815158 ]
1525 x_new: [[0.34324885 0.56230394 0.40060172]]
1526 fx_new [0.01551493]
1527 Expanding
1528
1529 xs: [[0.34324885 0.56230394 0.40060172]
1530 [0.33554117 0.54518985 0.3658795 ]
1531 [0.35836398 0.56364773 0.40115831]
1532 [0.32676715 0.54643001 0.37108763]
1533 [0.34663015 0.56180605 0.40711006]
1534 [0.35070906 0.54033239 0.35571289]
1535 [0.33862576 0.55886796 0.40723232]]
1536 fxs: [0.01551493 0.01582074 0.01583966 0.01592536 0.01661556 0.01676311
1537 0.01710963]
1538 Centroid: [0.34284087 0.55408256 0.38696892]
1539 x_new: [[0.34705598 0.54929716 0.36670552]]
1540 fx_new [0.01507761]
1541 Expanding
1542
1543 xs: [[0.34705598 0.54929716 0.36670552]
1544 [0.34324885 0.56230394 0.40060172]
1545 [0.33554117 0.54518985 0.3658795 ]
1546 [0.35836398 0.56364773 0.40115831]
1547 [0.32676715 0.54643001 0.37108763]
1548 [0.34663015 0.56180605 0.40711006]
1549 [0.35070906 0.54033239 0.35571289]]
1550 fxs: [0.01507761 0.01551493 0.01582074 0.01583966 0.01592536 0.01661556
1551 0.01676311]
1552 Centroid: [0.34404519 0.5527153 0.38117938]
1553 x_new: [[0.33738132 0.56509822 0.40664586]]
1554 fx_new [0.01570726]
1555 Back to top
1556
1557 xs: [[0.34705598 0.54929716 0.36670552]
1558 [0.34324885 0.56230394 0.40060172]
1559 [0.33738132 0.56509822 0.40664586]
1560 [0.33554117 0.54518985 0.3658795 ]
1561 [0.35836398 0.56364773 0.40115831]
1562 [0.32676715 0.54643001 0.37108763]
1563 [0.34663015 0.56180605 0.40711006]]
1564 fxs: [0.01507761 0.01551493 0.01570726 0.01582074 0.01583966 0.01592536
1565 0.01661556]
1566 Centroid: [0.34214123 0.55625328 0.38845551]
1567 x_new: [[0.33765231 0.55070051 0.36980097]]
1568 fx_new [0.01479669]
1569 Expanding
1570
1571 xs: [[0.33765231 0.55070051 0.36980097]
1572 [0.34705598 0.54929716 0.36670552]
1573 [0.34324885 0.56230394 0.40060172]
1574 [0.33738132 0.56509822 0.40664586]
1575 [0.33554117 0.54518985 0.3658795 ]
1576 [0.35836398 0.56364773 0.40115831]
1577 [0.32676715 0.54643001 0.37108763]]
1578 fxs: [0.01479669 0.01507761 0.01551493 0.01570726 0.01582074 0.01583966
1579 0.01592536]
1580 Centroid: [0.34085868 0.55466677 0.38312564]
1581 x_new: [[0.35495021 0.56290354 0.39516365]]
1582 fx_new [0.01505706]
1583 Back to top
1584
1585 xs: [[0.33765231 0.55070051 0.36980097]
1586 [0.35495021 0.56290354 0.39516365]
1587 [0.34705598 0.54929716 0.36670552]
1588 [0.34324885 0.56230394 0.40060172]
1589 [0.33738132 0.56509822 0.40664586]
1590 [0.33554117 0.54518985 0.3658795 ]
1591 [0.35836398 0.56364773 0.40115831]]
1592 fxs: [0.01479669 0.01505706 0.01507761 0.01551493 0.01570726 0.01582074

```

```

1593 0.01583966]
1594 Centroid: [0.34488483 0.55702014 0.38656508]
1595 x_new: [[0.33140569 0.55039254 0.37197184]]
1596 fx_new [0.01501632]
1597 Back to top
1598
1599 xs: [[0.33765231 0.55070051 0.36980097]
1600 [0.33140569 0.55039254 0.37197184]
1601 [0.35495021 0.56290354 0.39516365]
1602 [0.34705598 0.54929716 0.36670552]
1603 [0.34324885 0.56230394 0.40060172]
1604 [0.33738132 0.56509822 0.40664586]
1605 [0.33554117 0.54518985 0.3658795 ]]
1606 fxs: [0.01479669 0.01501632 0.01505706 0.01507761 0.01551493 0.01570726
1607 0.01582074]
1608 Centroid: [0.34103365 0.55512654 0.38239558]
1609 x_new: [[0.34652613 0.56506323 0.39891166]]
1610 fx_new [0.01479783]
1611 Back to top
1612
1613 xs: [[0.33765231 0.55070051 0.36980097]
1614 [0.34652613 0.56506323 0.39891166]
1615 [0.33140569 0.55039254 0.37197184]
1616 [0.35495021 0.56290354 0.39516365]
1617 [0.34705598 0.54929716 0.36670552]
1618 [0.34324885 0.56230394 0.40060172]
1619 [0.33738132 0.56509822 0.40664586]]
1620 fxs: [0.01479669 0.01479783 0.01501632 0.01505706 0.01507761 0.01551493
1621 0.01570726]
1622 Centroid: [0.34260293 0.55796559 0.38711446]
1623 x_new: [[0.34782454 0.55083296 0.36758306]]
1624 fx_new [0.01480049]
1625 Back to top
1626
1627 xs: [[0.33765231 0.55070051 0.36980097]
1628 [0.34652613 0.56506323 0.39891166]
1629 [0.34782454 0.55083296 0.36758306]
1630 [0.33140569 0.55039254 0.37197184]
1631 [0.35495021 0.56290354 0.39516365]
1632 [0.34705598 0.54929716 0.36670552]
1633 [0.34324885 0.56230394 0.40060172]]
1634 fxs: [0.01479669 0.01479783 0.01480049 0.01501632 0.01505706 0.01507761
1635 0.01551493]
1636 Centroid: [0.34409482 0.5559277 0.38153406]
1637 x_new: [[0.34494078 0.54955146 0.3624664 ]]
1638 fx_new [0.01469944]
1639 Expanding
1640
1641 xs: [[0.34494078 0.54955146 0.3624664 ]
1642 [0.33765231 0.55070051 0.36980097]
1643 [0.34652613 0.56506323 0.39891166]
1644 [0.34782454 0.55083296 0.36758306]
1645 [0.33140569 0.55039254 0.37197184]
1646 [0.35495021 0.56290354 0.39516365]
1647 [0.34705598 0.54929716 0.36670552]]
1648 fxs: [0.01469944 0.01479669 0.01479783 0.01480049 0.01501632 0.01505706
1649 0.01507761]
1650 Centroid: [0.34433652 0.55410592 0.37608616]
1651 x_new: [[0.34161706 0.55891467 0.3854668 ]]
1652 fx_new [0.01439701]
1653 Expanding
1654
1655 xs: [[0.34161706 0.55891467 0.3854668 ]
1656 [0.34494078 0.54955146 0.3624664 ]
1657 [0.33765231 0.55070051 0.36980097]
1658 [0.34652613 0.56506323 0.39891166]
1659 [0.34782454 0.55083296 0.36758306]
1660 [0.33140569 0.55039254 0.37197184]
1661 [0.35495021 0.56290354 0.39516365]]
1662 fxs: [0.01439701 0.01469944 0.01479669 0.01479783 0.01480049 0.01501632

```



```

1663 0.01505706]
1664 Centroid: [0.34355953 0.55547985 0.37876634]
1665 x_new: [[0.33216885 0.54805615 0.36236903]]
1666 fx_new [0.01491288]
1667 Back to top
1668
1669 xs: [[0.34161706 0.55891467 0.3854668 ]
1670 [0.34494078 0.54955146 0.3624664 ]
1671 [0.33765231 0.55070051 0.36980097]
1672 [0.34652613 0.56506323 0.39891166]
1673 [0.34782454 0.55083296 0.36758306]
1674 [0.33216885 0.54805615 0.36236903]
1675 [0.33140569 0.55039254 0.37197184]]
1676 fxs: [0.01439701 0.01469944 0.01479669 0.01479783 0.01480049 0.01491288
1677 0.01501632]
1678 Centroid: [0.34030505 0.55335879 0.37408139]
1679 x_new: [[0.34920441 0.55632503 0.37619095]]
1680 fx_new [0.01426394]
1681 Expanding
1682
1683 xs: [[0.35810377 0.55929128 0.3783005 ]
1684 [0.34161706 0.55891467 0.3854668 ]
1685 [0.34494078 0.54955146 0.3624664 ]
1686 [0.33765231 0.55070051 0.36980097]
1687 [0.34652613 0.56506323 0.39891166]
1688 [0.34782454 0.55083296 0.36758306]
1689 [0.33216885 0.54805615 0.36236903]]
1690 fxs: [0.01416509 0.01439701 0.01469944 0.01479669 0.01479783 0.01480049
1691 0.01491288]
1692 Centroid: [0.34411906 0.55463004 0.37498549]
1693 x_new: [[0.35606928 0.56120393 0.38760195]]
1694 fx_new [0.0145844]
1695 Back to top
1696
1697 xs: [[0.35810377 0.55929128 0.3783005 ]
1698 [0.34161706 0.55891467 0.3854668 ]
1699 [0.35606928 0.56120393 0.38760195]
1700 [0.34494078 0.54955146 0.3624664 ]
1701 [0.33765231 0.55070051 0.36980097]
1702 [0.34652613 0.56506323 0.39891166]
1703 [0.34782454 0.55083296 0.36758306]]
1704 fxs: [0.01416509 0.01439701 0.0145844 0.01469944 0.01479669 0.01479783
1705 0.01480049]
1706 Centroid: [0.34753341 0.55650829 0.37859019]
1707 x_new: [[0.34724228 0.56218362 0.38959732]]
1708 fx_new [0.0142758]
1709 Back to top
1710
1711 xs: [[0.35810377 0.55929128 0.3783005 ]
1712 [0.34724228 0.56218362 0.38959732]
1713 [0.34161706 0.55891467 0.3854668 ]
1714 [0.35606928 0.56120393 0.38760195]
1715 [0.34494078 0.54955146 0.3624664 ]
1716 [0.33765231 0.55070051 0.36980097]
1717 [0.34652613 0.56506323 0.39891166]]
1718 fxs: [0.01416509 0.0142758 0.01439701 0.0145844 0.01469944 0.01479669
1719 0.01479783]
1720 Centroid: [0.34745023 0.55812981 0.38173508]
1721 x_new: [[0.34837433 0.5511964 0.36455851]]
1722 fx_new [0.01453463]
1723 Back to top
1724
1725 xs: [[0.35810377 0.55929128 0.3783005 ]
1726 [0.34724228 0.56218362 0.38959732]
1727 [0.34161706 0.55891467 0.3854668 ]
1728 [0.34837433 0.5511964 0.36455851]
1729 [0.35606928 0.56120393 0.38760195]
1730 [0.34494078 0.54955146 0.3624664 ]
1731 [0.33765231 0.55070051 0.36980097]]
1732 fxs: [0.01416509 0.0142758 0.01439701 0.01453463 0.0145844 0.01469944

```

```

1733 0.01479669]
1734 Centroid: [0.34771426 0.55614884 0.37682749]
1735 x_new: [[0.3577762 0.56159716 0.38385402]]
1736 fx_new [0.01418939]
1737 Back to top
1738
1739 xs: [[0.35810377 0.55929128 0.3783005 ]
1740 [0.3577762 0.56159716 0.38385402]
1741 [0.34724228 0.56218362 0.38959732]
1742 [0.34161706 0.55891467 0.3854668 ]
1743 [0.34837433 0.5511964 0.36455851]
1744 [0.35606928 0.56120393 0.38760195]
1745 [0.34494078 0.54955146 0.3624664 ]]
1746 fxs: [0.01416509 0.01418939 0.0142758 0.01439701 0.01453463 0.0145844
1747 0.01469944]
1748 Centroid: [0.3505891 0.5577055 0.37883507]
1749 x_new: [[0.35623742 0.56585955 0.39520374]]
1750 fx_new [0.01451462]
1751 Back to top
1752
1753 xs: [[0.35810377 0.55929128 0.3783005 ]
1754 [0.3577762 0.56159716 0.38385402]
1755 [0.34724228 0.56218362 0.38959732]
1756 [0.34161706 0.55891467 0.3854668 ]
1757 [0.35623742 0.56585955 0.39520374]
1758 [0.34837433 0.5511964 0.36455851]
1759 [0.35606928 0.56120393 0.38760195]]
1760 fxs: [0.01416509 0.01418939 0.0142758 0.01439701 0.01451462 0.01453463
1761 0.0145844 ]
1762 Centroid: [0.35220291 0.56003523 0.38351183]
1763 x_new: [[0.34833654 0.55886653 0.37942172]]
1764 fx_new [0.0139701]
1765 Expanding
1766
1767 xs: [[0.34447017 0.55769783 0.3753316 ]
1768 [0.35810377 0.55929128 0.3783005 ]
1769 [0.3577762 0.56159716 0.38385402]
1770 [0.34724228 0.56218362 0.38959732]
1771 [0.34161706 0.55891467 0.3854668 ]
1772 [0.35623742 0.56585955 0.39520374]
1773 [0.34837433 0.5511964 0.36455851]]
1774 fxs: [0.01376209 0.01416509 0.01418939 0.0142758 0.01439701 0.01451462
1775 0.01453463]
1776 Centroid: [0.35054589 0.55953436 0.38175893]
1777 x_new: [[0.35271745 0.56787232 0.39895934]]
1778 fx_new [0.01444284]
1779 Back to top
1780
1781 xs: [[0.34447017 0.55769783 0.3753316 ]
1782 [0.35810377 0.55929128 0.3783005 ]
1783 [0.3577762 0.56159716 0.38385402]
1784 [0.34724228 0.56218362 0.38959732]
1785 [0.34161706 0.55891467 0.3854668 ]
1786 [0.35271745 0.56787232 0.39895934]
1787 [0.35623742 0.56585955 0.39520374]]
1788 fxs: [0.01376209 0.01416509 0.01418939 0.0142758 0.01439701 0.01444284
1789 0.01451462]
1790 Centroid: [0.35116634 0.56191663 0.38667333]
1791 x_new: [[0.34609525 0.55797372 0.37814292]]
1792 fx_new [0.01398492]
1793 Back to top
1794
1795 xs: [[0.34447017 0.55769783 0.3753316 ]
1796 [0.34609525 0.55797372 0.37814292]
1797 [0.35810377 0.55929128 0.3783005 ]
1798 [0.3577762 0.56159716 0.38385402]
1799 [0.34724228 0.56218362 0.38959732]
1800 [0.34161706 0.55891467 0.3854668 ]
1801 [0.35271745 0.56787232 0.39895934]]
1802 fxs: [0.01376209 0.01398492 0.01416509 0.01418939 0.0142758 0.01439701

```

```

1803 0.01444284]
1804 Centroid: [0.34971745 0.56079009 0.38423607]
1805 x_new: [[0.34671746 0.55370785 0.3695128 ]]
1806 fx_new [0.01424778]
1807 Back to top
1808
1809 xs: [[0.34447017 0.55769783 0.3753316 ]
1810 [0.34609525 0.55797372 0.37814292]
1811 [0.35810377 0.55929128 0.3783005 ]
1812 [0.3577762 0.56159716 0.38385402]
1813 [0.34671746 0.55370785 0.3695128 ]
1814 [0.34724228 0.56218362 0.38959732]
1815 [0.34161706 0.55891467 0.3854668 ]]
1816 fxs: [0.01376209 0.01398492 0.01416509 0.01418939 0.01424778 0.0142758
1817 0.01439701]
1818 Centroid: [0.34886031 0.55876659 0.38002942]
1819 x_new: [[0.35610357 0.55861851 0.37459205]]
1820 fx_new [0.01389517]
1821 Back to top
1822
1823 xs: [[0.34447017 0.55769783 0.3753316 ]
1824 [0.35610357 0.55861851 0.37459205]
1825 [0.34609525 0.55797372 0.37814292]
1826 [0.35810377 0.55929128 0.3783005 ]
1827 [0.3577762 0.56159716 0.38385402]
1828 [0.34671746 0.55370785 0.3695128 ]
1829 [0.34724228 0.56218362 0.38959732]]
1830 fxs: [0.01376209 0.01389517 0.01398492 0.01416509 0.01418939 0.01424778
1831 0.0142758 ]
1832 Centroid: [0.35092981 0.55872428 0.37847589]
1833 x_new: [[0.35461735 0.55526495 0.36735445]]
1834 fx_new [0.01402079]
1835 Back to top
1836
1837 xs: [[0.34447017 0.55769783 0.3753316 ]
1838 [0.35610357 0.55861851 0.37459205]
1839 [0.34609525 0.55797372 0.37814292]
1840 [0.35461735 0.55526495 0.36735445]
1841 [0.35810377 0.55929128 0.3783005 ]
1842 [0.3577762 0.56159716 0.38385402]
1843 [0.34671746 0.55370785 0.3695128 ]]
1844 fxs: [0.01376209 0.01389517 0.01398492 0.01402079 0.01416509 0.01418939
1845 0.01424778]
1846 Centroid: [0.35198339 0.5577359 0.37529833]
1847 x_new: [[0.35724933 0.56176395 0.38108387]]
1848 fx_new [0.01385667]
1849 Back to top
1850
1851 xs: [[0.34447017 0.55769783 0.3753316 ]
1852 [0.35724933 0.56176395 0.38108387]
1853 [0.35610357 0.55861851 0.37459205]
1854 [0.34609525 0.55797372 0.37814292]
1855 [0.35461735 0.55526495 0.36735445]
1856 [0.35810377 0.55929128 0.3783005 ]
1857 [0.3577762 0.56159716 0.38385402]]
1858 fxs: [0.01376209 0.01385667 0.01389517 0.01398492 0.01402079 0.01416509
1859 0.01418939]
1860 Centroid: [0.35348795 0.55888677 0.37695134]
1861 x_new: [[0.34919969 0.55617638 0.37004867]]
1862 fx_new [0.01380786]
1863 Back to top
1864
1865 xs: [[0.34447017 0.55769783 0.3753316 ]
1866 [0.34919969 0.55617638 0.37004867]
1867 [0.35724933 0.56176395 0.38108387]
1868 [0.35610357 0.55861851 0.37459205]
1869 [0.34609525 0.55797372 0.37814292]
1870 [0.35461735 0.55526495 0.36735445]
1871 [0.35810377 0.55929128 0.3783005 ]]
1872 fxs: [0.01376209 0.01380786 0.01385667 0.01389517 0.01398492 0.01402079

```

```

1873 0.01416509]
1874 Centroid: [0.35226273 0.55811237 0.37497915]
1875 x_new: [[0.34642169 0.55693347 0.37165781]]
1876 fx_new [0.01368145]
1877 Expanding
1878
1879 xs: [[0.34058066 0.55575456 0.36833646]
1880 [0.34447017 0.55769783 0.3753316 ]
1881 [0.34919969 0.55617638 0.37004867]
1882 [0.35724933 0.56176395 0.38108387]
1883 [0.35610357 0.55861851 0.37459205]
1884 [0.34609525 0.55797372 0.37814292]
1885 [0.35461735 0.55526495 0.36735445]]
1886 fxs: [0.01357924 0.01376209 0.01380786 0.01385667 0.01389517 0.01398492
1887 0.01402079]
1888 Centroid: [0.34975943 0.55760713 0.37355572]
1889 x_new: [[0.34490151 0.55994931 0.37975698]]
1890 fx_new [0.01367757]
1891 Back to top
1892
1893 xs: [[0.34058066 0.55575456 0.36833646]
1894 [0.34490151 0.55994931 0.37975698]
1895 [0.34447017 0.55769783 0.3753316 ]
1896 [0.34919969 0.55617638 0.37004867]
1897 [0.35724933 0.56176395 0.38108387]
1898 [0.35610357 0.55861851 0.37459205]
1899 [0.34609525 0.55797372 0.37814292]]
1900 fxs: [0.01357924 0.01367757 0.01376209 0.01380786 0.01385667 0.01389517
1901 0.01398492]
1902 Centroid: [0.34837145 0.55827632 0.37532751]
1903 x_new: [[0.35064766 0.55857893 0.37251209]]
1904 fx_new [0.01351772]
1905 Expanding
1906
1907 xs: [[0.35292386 0.55888153 0.36969668]
1908 [0.34058066 0.55575456 0.36833646]
1909 [0.34490151 0.55994931 0.37975698]
1910 [0.34447017 0.55769783 0.3753316 ]
1911 [0.34919969 0.55617638 0.37004867]
1912 [0.35724933 0.56176395 0.38108387]
1913 [0.35610357 0.55861851 0.37459205]]
1914 fxs: [0.01332372 0.01357924 0.01367757 0.01376209 0.01380786 0.01385667
1915 0.01389517]
1916 Centroid: [0.34934697 0.55840601 0.3741209 ]
1917 x_new: [[0.34259037 0.55819351 0.37364975]]
1918 fx_new [0.01347753]
1919 Back to top
1920
1921 xs: [[0.35292386 0.55888153 0.36969668]
1922 [0.34259037 0.55819351 0.37364975]
1923 [0.34058066 0.55575456 0.36833646]
1924 [0.34490151 0.55994931 0.37975698]
1925 [0.34447017 0.55769783 0.3753316 ]
1926 [0.34919969 0.55617638 0.37004867]
1927 [0.35724933 0.56176395 0.38108387]]
1928 fxs: [0.01332372 0.01347753 0.01357924 0.01367757 0.01376209 0.01380786
1929 0.01385667]
1930 Centroid: [0.34741651 0.5583453 0.37398629]
1931 x_new: [[0.33758369 0.55492665 0.36688871]]
1932 fx_new [0.01362986]
1933 Back to top
1934
1935 xs: [[0.35292386 0.55888153 0.36969668]
1936 [0.34259037 0.55819351 0.37364975]
1937 [0.34058066 0.55575456 0.36833646]
1938 [0.33758369 0.55492665 0.36688871]
1939 [0.34490151 0.55994931 0.37975698]
1940 [0.34447017 0.55769783 0.3753316 ]
1941 [0.34919969 0.55617638 0.37004867]]
1942 fxs: [0.01332372 0.01347753 0.01357924 0.01362986 0.01367757 0.01376209

```

```

1943 0.01380786]
1944 Centroid: [0.34460714 0.55736854 0.37195841]
1945 x_new: [[0.34001458 0.5585607 0.37386815]]
1946 fx_new [0.01337461]
1947 Back to top
1948
1949 xs: [[0.35292386 0.55888153 0.36969668]
1950 [0.34001458 0.5585607 0.37386815]
1951 [0.34259037 0.55819351 0.37364975]
1952 [0.34058066 0.55575456 0.36833646]
1953 [0.33758369 0.55492665 0.36688871]
1954 [0.34490151 0.55994931 0.37975698]
1955 [0.34447017 0.55769783 0.3753316 ]]
1956 fxs: [0.01332372 0.01337461 0.01347753 0.01357924 0.01362986 0.01367757
1957 0.01376209]
1958 Centroid: [0.34329498 0.55770916 0.37250405]
1959 x_new: [[0.34211979 0.55772048 0.36967649]]
1960 fx_new [0.0132673]
1961 Expanding
1962
1963 xs: [[0.3409446 0.55773181 0.36684894]
1964 [0.35292386 0.55888153 0.36969668]
1965 [0.34001458 0.5585607 0.37386815]
1966 [0.34259037 0.55819351 0.37364975]
1967 [0.34058066 0.55575456 0.36833646]
1968 [0.33758369 0.55492665 0.36688871]
1969 [0.34490151 0.55994931 0.37975698]]
1970 fxs: [0.01304803 0.01332372 0.01337461 0.01347753 0.01357924 0.01362986
1971 0.01367757]
1972 Centroid: [0.34279132 0.55771401 0.37129224]
1973 x_new: [[0.34068114 0.55547871 0.36282749]]
1974 fx_new [0.01328666]
1975 Back to top
1976
1977 xs: [[0.3409446 0.55773181 0.36684894]
1978 [0.34068114 0.55547871 0.36282749]
1979 [0.35292386 0.55888153 0.36969668]
1980 [0.34001458 0.5585607 0.37386815]
1981 [0.34259037 0.55819351 0.37364975]
1982 [0.34058066 0.55575456 0.36833646]
1983 [0.33758369 0.55492665 0.36688871]]
1984 fxs: [0.01304803 0.01328666 0.01332372 0.01337461 0.01347753 0.01357924
1985 0.01362986]
1986 Centroid: [0.34218841 0.55707535 0.36887374]
1987 x_new: [[0.34679313 0.55922406 0.37085877]]
1988 fx_new [0.01313324]
1989 Back to top
1990
1991 xs: [[0.3409446 0.55773181 0.36684894]
1992 [0.34679313 0.55922406 0.37085877]
1993 [0.34068114 0.55547871 0.36282749]
1994 [0.35292386 0.55888153 0.36969668]
1995 [0.34001458 0.5585607 0.37386815]
1996 [0.34259037 0.55819351 0.37364975]
1997 [0.34058066 0.55575456 0.36833646]]
1998 fxs: [0.01304803 0.01313324 0.01328666 0.01332372 0.01337461 0.01347753
1999 0.01357924]
2000 Centroid: [0.34350405 0.55768927 0.36944089]
2001 x_new: [[0.34642744 0.55962398 0.37054532]]
2002 fx_new [0.01301433]
2003 Expanding
2004
2005 xs: [[0.34935083 0.56155868 0.37164975]
2006 [0.3409446 0.55773181 0.36684894]
2007 [0.34679313 0.55922406 0.37085877]
2008 [0.34068114 0.55547871 0.36282749]
2009 [0.35292386 0.55888153 0.36969668]
2010 [0.34001458 0.5585607 0.37386815]
2011 [0.34259037 0.55819351 0.37364975]]
2012 fxs: [0.0127724 0.01304803 0.01313324 0.01328666 0.01332372 0.01337461

```

```

2013 0.01347753]
2014 Centroid: [0.34475693 0.55851843 0.36991422]
2015 x_new: [[0.34692349 0.55884335 0.36617868]]
2016 fx_new [0.01288938]
2017 Back to top
2018
2019 xs: [[0.34935083 0.56155868 0.37164975]
2020 [0.34692349 0.55884335 0.36617868]
2021 [0.3409446 0.55773181 0.36684894]
2022 [0.34679313 0.55922406 0.37085877]
2023 [0.34068114 0.55547871 0.36282749]
2024 [0.35292386 0.55888153 0.36969668]
2025 [0.34001458 0.5585607 0.37386815]]
2026 fxs: [0.0127724 0.01288938 0.01304803 0.01313324 0.01328666 0.01332372
2027 0.01337461]
2028 Centroid: [0.34537595 0.55861126 0.36884692]
2029 x_new: [[0.35073731 0.55866182 0.3638257 ]]
2030 fx_new [0.01289773]
2031 Back to top
2032
2033 xs: [[0.34935083 0.56155868 0.37164975]
2034 [0.34692349 0.55884335 0.36617868]
2035 [0.35073731 0.55866182 0.3638257 ]
2036 [0.3409446 0.55773181 0.36684894]
2037 [0.34679313 0.55922406 0.37085877]
2038 [0.34068114 0.55547871 0.36282749]
2039 [0.35292386 0.55888153 0.36969668]]
2040 fxs: [0.0127724 0.01288938 0.01289773 0.01304803 0.01313324 0.01328666
2041 0.01332372]
2042 Centroid: [0.34690777 0.55862571 0.36741229]
2043 x_new: [[0.34089167 0.55836988 0.3651279 ]]
2044 fx_new [0.01279622]
2045 Back to top
2046
2047 xs: [[0.34935083 0.56155868 0.37164975]
2048 [0.34089167 0.55836988 0.3651279 ]
2049 [0.34692349 0.55884335 0.36617868]
2050 [0.35073731 0.55866182 0.3638257 ]
2051 [0.3409446 0.55773181 0.36684894]
2052 [0.34679313 0.55922406 0.37085877]
2053 [0.34068114 0.55547871 0.36282749]]
2054 fxs: [0.0127724 0.01279622 0.01288938 0.01289773 0.01304803 0.01313324
2055 0.01328666]
2056 Centroid: [0.34518888 0.55855262 0.36675961]
2057 x_new: [[0.34969663 0.56162652 0.37069172]]
2058 fx_new [0.01269684]
2059 Expanding
2060
2061 xs: [[0.35420437 0.56470043 0.37462383]
2062 [0.34935083 0.56155868 0.37164975]
2063 [0.34089167 0.55836988 0.3651279 ]
2064 [0.34692349 0.55884335 0.36617868]
2065 [0.35073731 0.55866182 0.3638257 ]
2066 [0.3409446 0.55773181 0.36684894]
2067 [0.34679313 0.55922406 0.37085877]]
2068 fxs: [0.01253762 0.0127724 0.01279622 0.01288938 0.01289773 0.01304803
2069 0.01313324]
2070 Centroid: [0.34712077 0.55987 0.3684448 ]
2071 x_new: [[0.34744841 0.56051595 0.36603082]]
2072 fx_new [0.01253634]
2073 Expanding
2074
2075 xs: [[0.34777605 0.56116189 0.36361685]
2076 [0.35420437 0.56470043 0.37462383]
2077 [0.34935083 0.56155868 0.37164975]
2078 [0.34089167 0.55836988 0.3651279 ]
2079 [0.34692349 0.55884335 0.36617868]
2080 [0.35073731 0.55866182 0.3638257 ]
2081 [0.3409446 0.55773181 0.36684894]]
2082 fxs: [0.01225694 0.01253762 0.0127724 0.01279622 0.01288938 0.01289773

```

```

2083 0.01304803]
2084 Centroid: [0.34726119 0.56014684 0.36741024]
2085 x_new: [[0.35357778 0.56256187 0.36797154]]
2086 fx_new [0.01244745]
2087 Back to top
2088
2089 xs: [[0.34777605 0.56116189 0.36361685]
2090 [0.35357778 0.56256187 0.36797154]
2091 [0.35420437 0.56470043 0.37462383]
2092 [0.34935083 0.56155868 0.37164975]
2093 [0.34089167 0.55836988 0.3651279 ]
2094 [0.34692349 0.55884335 0.36617868]
2095 [0.35073731 0.55866182 0.3638257 ]]
2096 fxs: [0.01225694 0.01244745 0.01253762 0.0127724 0.01279622 0.01288938
2097 0.01289773]
2098 Centroid: [0.34906593 0.56083685 0.36757061]
2099 x_new: [[0.34739455 0.56301187 0.37131551]]
2100 fx_new [0.01238468]
2101 Back to top
2102
2103 xs: [[0.34777605 0.56116189 0.36361685]
2104 [0.34739455 0.56301187 0.37131551]
2105 [0.35357778 0.56256187 0.36797154]
2106 [0.35420437 0.56470043 0.37462383]
2107 [0.34935083 0.56155868 0.37164975]
2108 [0.34089167 0.55836988 0.3651279 ]
2109 [0.34692349 0.55884335 0.36617868]]
2110 fxs: [0.01225694 0.01238468 0.01244745 0.01253762 0.0127724 0.01279622
2111 0.01288938]
2112 Centroid: [0.34858839 0.56145828 0.36864058]
2113 x_new: [[0.3502533 0.56407321 0.37110248]]
2114 fx_new [0.01223821]
2115 Expanding
2116
2117 xs: [[0.3519182 0.56668815 0.37356438]
2118 [0.34777605 0.56116189 0.36361685]
2119 [0.34739455 0.56301187 0.37131551]
2120 [0.35357778 0.56256187 0.36797154]
2121 [0.35420437 0.56470043 0.37462383]
2122 [0.34935083 0.56155868 0.37164975]
2123 [0.34089167 0.55836988 0.3651279 ]]
2124 fxs: [0.01195964 0.01225694 0.01238468 0.01244745 0.01253762 0.0127724
2125 0.01279622]
2126 Centroid: [0.34930192 0.56257897 0.36969568]
2127 x_new: [[0.35771217 0.56678805 0.37426346]]
2128 fx_new [0.01224534]
2129 Back to top
2130
2131 xs: [[0.3519182 0.56668815 0.37356438]
2132 [0.35771217 0.56678805 0.37426346]
2133 [0.34777605 0.56116189 0.36361685]
2134 [0.34739455 0.56301187 0.37131551]
2135 [0.35357778 0.56256187 0.36797154]
2136 [0.35420437 0.56470043 0.37462383]
2137 [0.34935083 0.56155868 0.37164975]]
2138 fxs: [0.01195964 0.01224534 0.01225694 0.01238468 0.01244745 0.01253762
2139 0.0127724 ]
2140 Centroid: [0.35170485 0.56378156 0.37100076]
2141 x_new: [[0.35405887 0.56600444 0.37035177]]
2142 fx_new [0.0119328]
2143 Expanding
2144
2145 xs: [[0.35641289 0.56822732 0.36970277]
2146 [0.3519182 0.56668815 0.37356438]
2147 [0.35771217 0.56678805 0.37426346]
2148 [0.34777605 0.56116189 0.36361685]
2149 [0.34739455 0.56301187 0.37131551]
2150 [0.35357778 0.56256187 0.36797154]
2151 [0.35420437 0.56470043 0.37462383]]
2152 fxs: [0.01154571 0.01195964 0.01224534 0.01225694 0.01238468 0.01244745

```

```

2153 0.01253762]
2154 Centroid: [0.35271372 0.56473422 0.37072262]
2155 x_new: [[0.35122306 0.56476802 0.36682141]]
2156 fx_new [0.01182483]
2157 Back to top
2158
2159 xs: [[0.35641289 0.56822732 0.36970277]
2160 [0.35122306 0.56476802 0.36682141]
2161 [0.3519182 0.56668815 0.37356438]
2162 [0.35771217 0.56678805 0.37426346]
2163 [0.34777605 0.56116189 0.36361685]
2164 [0.34739455 0.56301187 0.37131551]
2165 [0.35357778 0.56256187 0.36797154]]
2166 fxs: [0.01154571 0.01182483 0.01195964 0.01224534 0.01225694 0.01238468
2167 0.01244745]
2168 Centroid: [0.35228782 0.56474388 0.36960799]
2169 x_new: [[0.35099785 0.5669259 0.37124444]]
2170 fx_new [0.01169751]
2171 Back to top
2172
2173 xs: [[0.35641289 0.56822732 0.36970277]
2174 [0.35099785 0.5669259 0.37124444]
2175 [0.35122306 0.56476802 0.36682141]
2176 [0.3519182 0.56668815 0.37356438]
2177 [0.35771217 0.56678805 0.37426346]
2178 [0.34777605 0.56116189 0.36361685]
2179 [0.34739455 0.56301187 0.37131551]]
2180 fxs: [0.01154571 0.01169751 0.01182483 0.01195964 0.01224534 0.01225694
2181 0.01238468]
2182 Centroid: [0.35191925 0.56536731 0.37007555]
2183 x_new: [[0.35644396 0.56772276 0.36883558]]
2184 fx_new [0.01158441]
2185 Back to top
2186
2187 xs: [[0.35641289 0.56822732 0.36970277]
2188 [0.35644396 0.56772276 0.36883558]
2189 [0.35099785 0.5669259 0.37124444]
2190 [0.35122306 0.56476802 0.36682141]
2191 [0.3519182 0.56668815 0.37356438]
2192 [0.35771217 0.56678805 0.37426346]
2193 [0.34777605 0.56116189 0.36361685]]
2194 fxs: [0.01154571 0.01158441 0.01169751 0.01182483 0.01195964 0.01224534
2195 0.01225694]
2196 Centroid: [0.35321203 0.5660403 0.36972127]
2197 x_new: [[0.358648 0.57091871 0.37582569]]
2198 fx_new [0.0116141]
2199 Back to top
2200
2201 xs: [[0.35641289 0.56822732 0.36970277]
2202 [0.35644396 0.56772276 0.36883558]
2203 [0.358648 0.57091871 0.37582569]
2204 [0.35099785 0.5669259 0.37124444]
2205 [0.35122306 0.56476802 0.36682141]
2206 [0.3519182 0.56668815 0.37356438]
2207 [0.35771217 0.56678805 0.37426346]]
2208 fxs: [0.01154571 0.01158441 0.0116141 0.01169751 0.01182483 0.01195964
2209 0.01224534]
2210 Centroid: [0.35476516 0.56743413 0.37146539]
2211 x_new: [[0.35181815 0.56808021 0.36866732]]
2212 fx_new [0.01130947]
2213 Expanding
2214
2215 xs: [[0.34887114 0.56872629 0.36586925]
2216 [0.35641289 0.56822732 0.36970277]
2217 [0.35644396 0.56772276 0.36883558]
2218 [0.358648 0.57091871 0.37582569]
2219 [0.35099785 0.5669259 0.37124444]
2220 [0.35122306 0.56476802 0.36682141]
2221 [0.3519182 0.56668815 0.37356438]]
2222 fxs: [0.01089233 0.01154571 0.01158441 0.0116141 0.01169751 0.01182483

```



```

2223 0.01195964]
2224 Centroid: [0.35350216 0.56771102 0.37026622]
2225 x_new: [[0.35508612 0.56873389 0.36696806]]
2226 fx_new [0.01119531]
2227 Back to top
2228
2229 xs: [[0.34887114 0.56872629 0.36586925]
2230 [0.35508612 0.56873389 0.36696806]
2231 [0.35641289 0.56822732 0.36970277]
2232 [0.35644396 0.56772276 0.36883558]
2233 [0.358648 0.57091871 0.37582569]
2234 [0.35099785 0.5669259 0.37124444]
2235 [0.35122306 0.56476802 0.36682141]]
2236 fxs: [0.01089233 0.01119531 0.01154571 0.01158441 0.0116141 0.01169751
2237 0.01182483]
2238 Centroid: [0.35395472 0.56800327 0.36932388]
2239 x_new: [[0.35668637 0.57123852 0.37182636]]
2240 fx_new [0.01113361]
2241 Back to top
2242
2243 xs: [[0.34887114 0.56872629 0.36586925]
2244 [0.35668637 0.57123852 0.37182636]
2245 [0.35508612 0.56873389 0.36696806]
2246 [0.35641289 0.56822732 0.36970277]
2247 [0.35644396 0.56772276 0.36883558]
2248 [0.358648 0.57091871 0.37582569]
2249 [0.35099785 0.5669259 0.37124444]]
2250 fxs: [0.01089233 0.01113361 0.01119531 0.01154571 0.01158441 0.0116141
2251 0.01169751]
2252 Centroid: [0.35473519 0.56892763 0.37003888]
2253 x_new: [[0.35847253 0.57092936 0.36883331]]
2254 fx_new [0.01105786]
2255 Back to top
2256
2257 xs: [[0.34887114 0.56872629 0.36586925]
2258 [0.35847253 0.57092936 0.36883331]
2259 [0.35668637 0.57123852 0.37182636]
2260 [0.35508612 0.56873389 0.36696806]
2261 [0.35641289 0.56822732 0.36970277]
2262 [0.35644396 0.56772276 0.36883558]
2263 [0.358648 0.57091871 0.37582569]]
2264 fxs: [0.01089233 0.01105786 0.01113361 0.01119531 0.01154571 0.01158441
2265 0.0116141 ]
2266 Centroid: [0.355803 0.56949955 0.36969443]
2267 x_new: [[0.352958 0.56808039 0.36356317]]
2268 fx_new [0.01101822]
2269 Back to top
2270
2271 xs: [[0.34887114 0.56872629 0.36586925]
2272 [0.352958 0.56808039 0.36356317]
2273 [0.35847253 0.57092936 0.36883331]
2274 [0.35668637 0.57123852 0.37182636]
2275 [0.35508612 0.56873389 0.36696806]
2276 [0.35641289 0.56822732 0.36970277]
2277 [0.35644396 0.56772276 0.36883558]]
2278 fxs: [0.01089233 0.01101822 0.01105786 0.01113361 0.01119531 0.01154571
2279 0.01158441]
2280 Centroid: [0.35499015 0.56909408 0.36794264]
2281 x_new: [[0.35353633 0.57046539 0.36704971]]
2282 fx_new [0.01079964]
2283 Expanding
2284
2285 xs: [[0.35208252 0.57183671 0.36615677]
2286 [0.34887114 0.56872629 0.36586925]
2287 [0.352958 0.56808039 0.36356317]
2288 [0.35847253 0.57092936 0.36883331]
2289 [0.35668637 0.57123852 0.37182636]
2290 [0.35508612 0.56873389 0.36696806]
2291 [0.35641289 0.56822732 0.36970277]]
2292 fxs: [0.01042163 0.01089233 0.01101822 0.01105786 0.01113361 0.01119531

```

```

2293 0.01154571]
2294 Centroid: [0.35436708 0.56968178 0.36755996]
2295 x_new: [[0.35232127 0.57113624 0.36541714]]
2296 fx_new [0.01051597]
2297 Back to top
2298
2299 xs: [[0.35208252 0.57183671 0.36615677]
2300 [0.35232127 0.57113624 0.36541714]
2301 [0.34887114 0.56872629 0.36586925]
2302 [0.352958 0.56808039 0.36356317]
2303 [0.35847253 0.57092936 0.36883331]
2304 [0.35668637 0.57123852 0.37182636]
2305 [0.35508612 0.56873389 0.36696806]]
2306 fxs: [0.01042163 0.01051597 0.01089233 0.01101822 0.01105786 0.01113361
2307 0.01119531]
2308 Centroid: [0.35378257 0.57009734 0.36694772]
2309 x_new: [[0.35247902 0.57146079 0.36692739]]
2310 fx_new [0.01055928]
2311 Back to top
2312
2313 xs: [[0.35208252 0.57183671 0.36615677]
2314 [0.35232127 0.57113624 0.36541714]
2315 [0.35247902 0.57146079 0.36692739]
2316 [0.34887114 0.56872629 0.36586925]
2317 [0.352958 0.56808039 0.36356317]
2318 [0.35847253 0.57092936 0.36883331]
2319 [0.35668637 0.57123852 0.37182636]]
2320 fxs: [0.01042163 0.01051597 0.01055928 0.01089233 0.01101822 0.01105786
2321 0.01113361]
2322 Centroid: [0.35341012 0.5704869 0.36694191]
2323 x_new: [[0.35013387 0.56973528 0.36205747]]
2324 fx_new [0.01050303]
2325 Back to top
2326
2327 xs: [[0.35208252 0.57183671 0.36615677]
2328 [0.35013387 0.56973528 0.36205747]
2329 [0.35232127 0.57113624 0.36541714]
2330 [0.35247902 0.57146079 0.36692739]
2331 [0.34887114 0.56872629 0.36586925]
2332 [0.352958 0.56808039 0.36356317]
2333 [0.35847253 0.57092936 0.36883331]]
2334 fxs: [0.01042163 0.01050303 0.01051597 0.01055928 0.01089233 0.01101822
2335 0.01105786]
2336 Centroid: [0.35247405 0.57027215 0.36554636]
2337 x_new: [[0.34647557 0.56961495 0.3622594 ]]
2338 fx_new [0.01042847]
2339 Back to top
2340
2341 xs: [[0.35208252 0.57183671 0.36615677]
2342 [0.34647557 0.56961495 0.3622594 ]
2343 [0.35013387 0.56973528 0.36205747]
2344 [0.35232127 0.57113624 0.36541714]
2345 [0.35247902 0.57146079 0.36692739]
2346 [0.34887114 0.56872629 0.36586925]
2347 [0.352958 0.56808039 0.36356317]]
2348 fxs: [0.01042163 0.01042847 0.01050303 0.01051597 0.01055928 0.01089233
2349 0.01101822]
2350 Centroid: [0.3507602 0.57008438 0.36460723]
2351 x_new: [[0.34856239 0.57208837 0.36565128]]
2352 fx_new [0.01022143]
2353 Expanding
2354
2355 xs: [[0.34636459 0.57409235 0.36669534]
2356 [0.35208252 0.57183671 0.36615677]
2357 [0.34647557 0.56961495 0.3622594 ]
2358 [0.35013387 0.56973528 0.36205747]
2359 [0.35232127 0.57113624 0.36541714]
2360 [0.35247902 0.57146079 0.36692739]
2361 [0.34887114 0.56872629 0.36586925]]
2362 fxs: [0.00985284 0.01042163 0.01042847 0.01050303 0.01051597 0.01055928

```

```

2363 0.01089233]
2364 Centroid: [0.34981828 0.57094323 0.36505468]
2365 x_new: [[0.35076542 0.57316017 0.36424011]]
2366 fx_new [0.01000257]
2367 Back to top
2368
2369 xs: [[0.34636459 0.57409235 0.36669534]
2370 [0.35076542 0.57316017 0.36424011]
2371 [0.35208252 0.57183671 0.36615677]
2372 [0.34647557 0.56961495 0.3622594 ]
2373 [0.35013387 0.56973528 0.36205747]
2374 [0.35232127 0.57113624 0.36541714]
2375 [0.35247902 0.57146079 0.36692739]]
2376 fxs: [0.00985284 0.01000257 0.01042163 0.01042847 0.01050303 0.01051597
2377 0.01055928]
2378 Centroid: [0.35008889 0.57157664 0.36482195]
2379 x_new: [[0.34769877 0.57169249 0.3627165 ]]
2380 fx_new [0.01008983]
2381 Back to top
2382
2383 xs: [[0.34636459 0.57409235 0.36669534]
2384 [0.35076542 0.57316017 0.36424011]
2385 [0.34769877 0.57169249 0.3627165 ]
2386 [0.35208252 0.57183671 0.36615677]
2387 [0.34647557 0.56961495 0.3622594 ]
2388 [0.35013387 0.56973528 0.36205747]
2389 [0.35232127 0.57113624 0.36541714]]
2390 fxs: [0.00985284 0.01000257 0.01008983 0.01042163 0.01042847 0.01050303
2391 0.01051597]
2392 Centroid: [0.349406 0.57160974 0.36422039]
2393 x_new: [[0.34649073 0.57208324 0.36302364]]
2394 fx_new [0.01000066]
2395 Back to top
2396
2397 xs: [[0.34636459 0.57409235 0.36669534]
2398 [0.34649073 0.57208324 0.36302364]
2399 [0.35076542 0.57316017 0.36424011]
2400 [0.34769877 0.57169249 0.3627165 ]
2401 [0.35208252 0.57183671 0.36615677]
2402 [0.34647557 0.56961495 0.3622594 ]
2403 [0.35013387 0.56973528 0.36205747]]
2404 fxs: [0.00985284 0.01000066 0.01000257 0.01008983 0.01042163 0.01042847
2405 0.01050303]
2406 Centroid: [0.34857307 0.57174503 0.36387846]
2407 x_new: [[0.34701226 0.57375477 0.36569946]]
2408 fx_new [0.0098673]
2409 Back to top
2410
2411 xs: [[0.34636459 0.57409235 0.36669534]
2412 [0.34701226 0.57375477 0.36569946]
2413 [0.34649073 0.57208324 0.36302364]
2414 [0.35076542 0.57316017 0.36424011]
2415 [0.34769877 0.57169249 0.3627165 ]
2416 [0.35208252 0.57183671 0.36615677]
2417 [0.34647557 0.56961495 0.3622594 ]]
2418 fxs: [0.00985284 0.0098673 0.01000066 0.01000257 0.01008983 0.01042163
2419 0.01042847]
2420 Centroid: [0.34812712 0.57231924 0.36439875]
2421 x_new: [[0.34977868 0.57502354 0.36653809]]
2422 fx_new [0.00977147]
2423 Expanding
2424
2425 xs: [[0.35143023 0.57772783 0.36867743]
2426 [0.34636459 0.57409235 0.36669534]
2427 [0.34701226 0.57375477 0.36569946]
2428 [0.34649073 0.57208324 0.36302364]
2429 [0.35076542 0.57316017 0.36424011]
2430 [0.34769877 0.57169249 0.3627165 ]
2431 [0.35208252 0.57183671 0.36615677]]
2432 fxs: [0.00948682 0.00985284 0.0098673 0.01000066 0.01000257 0.01008983

```

```

2433 0.01042163]
2434 Centroid: [0.34883493 0.57347822 0.36531561]
2435 x_new: [[0.34558735 0.57511974 0.36447444]]
2436 fx_new [0.00950077]
2437 Back to top
2438
2439 xs: [[0.35143023 0.57772783 0.36867743]
2440 [0.34558735 0.57511974 0.36447444]
2441 [0.34636459 0.57409235 0.36669534]
2442 [0.34701226 0.57375477 0.36569946]
2443 [0.34649073 0.57208324 0.36302364]
2444 [0.35076542 0.57316017 0.36424011]
2445 [0.34769877 0.57169249 0.3627165 ]]
2446 fxs: [0.00948682 0.00950077 0.0095284 0.0098673 0.01000066 0.01000257
2447 0.01008983]
2448 Centroid: [0.34790705 0.57394723 0.36507527]
2449 x_new: [[0.34811533 0.57620197 0.36743405]]
2450 fx_new [0.00956523]
2451 Back to top
2452
2453 xs: [[0.35143023 0.57772783 0.36867743]
2454 [0.34558735 0.57511974 0.36447444]
2455 [0.34811533 0.57620197 0.36743405]
2456 [0.34636459 0.57409235 0.36669534]
2457 [0.34701226 0.57375477 0.36569946]
2458 [0.34649073 0.57208324 0.36302364]
2459 [0.35076542 0.57316017 0.36424011]]
2460 fxs: [0.00948682 0.00950077 0.00956523 0.00985284 0.0098673 0.01000066
2461 0.01000257]
2462 Centroid: [0.34796656 0.57459144 0.36574921]
2463 x_new: [[0.3451677 0.57602271 0.36725831]]
2464 fx_new [0.00950728]
2465 Back to top
2466
2467 xs: [[0.35143023 0.57772783 0.36867743]
2468 [0.34558735 0.57511974 0.36447444]
2469 [0.3451677 0.57602271 0.36725831]
2470 [0.34811533 0.57620197 0.36743405]
2471 [0.34636459 0.57409235 0.36669534]
2472 [0.34701226 0.57375477 0.36569946]
2473 [0.34649073 0.57208324 0.36302364]]
2474 fxs: [0.00948682 0.00950077 0.00950728 0.00956523 0.00985284 0.0098673
2475 0.01000066]
2476 Centroid: [0.34716688 0.57500037 0.36618038]
2477 x_new: [[0.34784304 0.5779175 0.36933712]]
2478 fx_new [0.00938322]
2479 Expanding
2480
2481 xs: [[0.34851919 0.58083463 0.37249386]
2482 [0.35143023 0.57772783 0.36867743]
2483 [0.34558735 0.57511974 0.36447444]
2484 [0.3451677 0.57602271 0.36725831]
2485 [0.34811533 0.57620197 0.36743405]
2486 [0.34636459 0.57409235 0.36669534]
2487 [0.34701226 0.57375477 0.36569946]]
2488 fxs: [0.0091313 0.00948682 0.00950077 0.00950728 0.00956523 0.00985284
2489 0.0098673 ]
2490 Centroid: [0.34745666 0.57625057 0.36753327]
2491 x_new: [[0.34790106 0.57874637 0.36936708]]
2492 fx_new [0.00924063]
2493 Back to top
2494
2495 xs: [[0.34851919 0.58083463 0.37249386]
2496 [0.34790106 0.57874637 0.36936708]
2497 [0.35143023 0.57772783 0.36867743]
2498 [0.34558735 0.57511974 0.36447444]
2499 [0.3451677 0.57602271 0.36725831]
2500 [0.34811533 0.57620197 0.36743405]
2501 [0.34636459 0.57409235 0.36669534]]
2502 fxs: [0.0091313 0.00924063 0.00948682 0.00950077 0.00950728 0.00956523

```

```

2503 0.00985284]
2504 Centroid: [0.34758363 0.57696366 0.36805722]
2505 x_new: [[0.34880268 0.57983496 0.3694191 ]]
2506 fx_new [0.00908123]
2507 Expanding
2508
2509 xs: [[0.35002173 0.58270626 0.37078098]
2510 [0.34851919 0.58083463 0.37249386]
2511 [0.34790106 0.57874637 0.36936708]
2512 [0.35143023 0.57772783 0.36867743]
2513 [0.34558735 0.57511974 0.36447444]
2514 [0.3451677 0.57602271 0.36725831]
2515 [0.34811533 0.57620197 0.36743405]]
2516 fxs: [0.00873018 0.0091313 0.00924063 0.00948682 0.00950077 0.00950728
2517 0.00956523]
2518 Centroid: [0.34810608 0.57819422 0.36864088]
2519 x_new: [[0.34809684 0.58018647 0.36984771]]
2520 fx_new [0.00903009]
2521 Back to top
2522
2523 xs: [[0.35002173 0.58270626 0.37078098]
2524 [0.34809684 0.58018647 0.36984771]
2525 [0.34851919 0.58083463 0.37249386]
2526 [0.34790106 0.57874637 0.36936708]
2527 [0.35143023 0.57772783 0.36867743]
2528 [0.34558735 0.57511974 0.36447444]
2529 [0.3451677 0.57602271 0.36725831]]
2530 fxs: [0.00873018 0.00903009 0.0091313 0.00924063 0.00948682 0.00950077
2531 0.00950728]
2532 Centroid: [0.34810344 0.57876343 0.36898569]
2533 x_new: [[0.35103919 0.58150415 0.37071307]]
2534 fx_new [0.0089634]
2535 Back to top
2536
2537 xs: [[0.35002173 0.58270626 0.37078098]
2538 [0.35103919 0.58150415 0.37071307]
2539 [0.34809684 0.58018647 0.36984771]
2540 [0.34851919 0.58083463 0.37249386]
2541 [0.34790106 0.57874637 0.36936708]
2542 [0.35143023 0.57772783 0.36867743]
2543 [0.34558735 0.57511974 0.36447444]]
2544 fxs: [0.00873018 0.0089634 0.00903009 0.0091313 0.00924063 0.00948682
2545 0.00950077]
2546 Centroid: [0.34894223 0.57954649 0.36947923]
2547 x_new: [[0.35229711 0.58397325 0.37448401]]
2548 fx_new [0.0088912]
2549 Back to top
2550
2551 xs: [[0.35002173 0.58270626 0.37078098]
2552 [0.35229711 0.58397325 0.37448401]
2553 [0.35103919 0.58150415 0.37071307]
2554 [0.34809684 0.58018647 0.36984771]
2555 [0.34851919 0.58083463 0.37249386]
2556 [0.34790106 0.57874637 0.36936708]
2557 [0.35143023 0.57772783 0.36867743]]
2558 fxs: [0.00873018 0.0088912 0.0089634 0.00903009 0.0091313 0.00924063
2559 0.00948682]
2560 Centroid: [0.34990076 0.58081128 0.37090916]
2561 x_new: [[0.3483713 0.58389473 0.37314089]]
2562 fx_new [0.00866198]
2563 Expanding
2564
2565 xs: [[0.34684183 0.58697818 0.37537262]
2566 [0.35002173 0.58270626 0.37078098]
2567 [0.35229711 0.58397325 0.37448401]
2568 [0.35103919 0.58150415 0.37071307]
2569 [0.34809684 0.58018647 0.36984771]
2570 [0.34851919 0.58083463 0.37249386]
2571 [0.34790106 0.57874637 0.36936708]]
2572 fxs: [0.00830004 0.00873018 0.0088912 0.0089634 0.00903009 0.0091313

```

```

2573 0.00924063]
2574 Centroid: [0.34924528 0.58213276 0.37186562]
2575 x_new: [[0.35058949 0.58551915 0.37436415]]
2576 fx_new [0.00856622]
2577 Back to top
2578
2579 xs: [[0.34684183 0.58697818 0.37537262]
2580 [0.35058949 0.58551915 0.37436415]
2581 [0.35002173 0.58270626 0.37078098]
2582 [0.35229711 0.58397325 0.37448401]
2583 [0.35103919 0.58150415 0.37071307]
2584 [0.34809684 0.58018647 0.36984771]
2585 [0.34851919 0.58083463 0.37249386]]
2586 fxs: [0.00830004 0.00856622 0.00873018 0.0088912 0.0089634 0.00903009
2587 0.0091313 ]
2588 Centroid: [0.34962934 0.5831003 0.37257949]
2589 x_new: [[0.35073949 0.58536597 0.37266511]]
2590 fx_new [0.00845977]
2591 Back to top
2592
2593 xs: [[0.34684183 0.58697818 0.37537262]
2594 [0.35073949 0.58536597 0.37266511]
2595 [0.35058949 0.58551915 0.37436415]
2596 [0.35002173 0.58270626 0.37078098]
2597 [0.35229711 0.58397325 0.37448401]
2598 [0.35103919 0.58150415 0.37071307]
2599 [0.34809684 0.58018647 0.36984771]]
2600 fxs: [0.00830004 0.00845977 0.00856622 0.00873018 0.0088912 0.0089634
2601 0.00903009]
2602 Centroid: [0.34994652 0.58374763 0.37260395]
2603 x_new: [[0.35179621 0.5873088 0.37536019]]
2604 fx_new [0.00840481]
2605 Back to top
2606
2607 xs: [[0.34684183 0.58697818 0.37537262]
2608 [0.35179621 0.5873088 0.37536019]
2609 [0.35073949 0.58536597 0.37266511]
2610 [0.35058949 0.58551915 0.37436415]
2611 [0.35002173 0.58270626 0.37078098]
2612 [0.35229711 0.58397325 0.37448401]
2613 [0.35103919 0.58150415 0.37071307]]
2614 fxs: [0.00830004 0.00840481 0.00845977 0.00856622 0.00873018 0.0088912
2615 0.0089634 ]
2616 Centroid: [0.35047501 0.58476511 0.37339145]
2617 x_new: [[0.34991082 0.58802606 0.37606982]]
2618 fx_new [0.00828557]
2619 Expanding
2620
2621 xs: [[0.34934664 0.59128702 0.3787482 ]
2622 [0.34684183 0.58697818 0.37537262]
2623 [0.35179621 0.5873088 0.37536019]
2624 [0.35073949 0.58536597 0.37266511]
2625 [0.35058949 0.58551915 0.37436415]
2626 [0.35002173 0.58270626 0.37078098]
2627 [0.35229711 0.58397325 0.37448401]]
2628 fxs: [0.00800103 0.00830004 0.00840481 0.00845977 0.00856622 0.00873018
2629 0.0088912 ]
2630 Centroid: [0.35023321 0.58616266 0.37453932]
2631 x_new: [[0.34816932 0.58835208 0.37459464]]
2632 fx_new [0.00805578]
2633 Back to top
2634
2635 xs: [[0.34934664 0.59128702 0.3787482 ]
2636 [0.34816932 0.58835208 0.37459464]
2637 [0.34684183 0.58697818 0.37537262]
2638 [0.35179621 0.5873088 0.37536019]
2639 [0.35073949 0.58536597 0.37266511]
2640 [0.35058949 0.58551915 0.37436415]
2641 [0.35002173 0.58270626 0.37078098]]
2642 fxs: [0.00800103 0.00805578 0.00830004 0.00840481 0.00845977 0.00856622

```

```

2643 0.00873018]
2644 Centroid: [0.34964353 0.58678821 0.37455513]
2645 x_new: [[0.34926533 0.59087015 0.37832928]]
2646 fx_new [0.00802358]
2647 Back to top
2648
2649 xs: [[0.34934664 0.59128702 0.3787482 ]
2650 [0.34926533 0.59087015 0.37832928]
2651 [0.34816932 0.58835208 0.37459464]
2652 [0.34684183 0.58697818 0.37537262]
2653 [0.35179621 0.5873088 0.37536019]
2654 [0.35073949 0.58536597 0.37266511]
2655 [0.35058949 0.58551915 0.37436415]]
2656 fxs: [0.00800103 0.00802358 0.00805578 0.00830004 0.00840481 0.00845977
2657 0.00856622]
2658 Centroid: [0.34953547 0.58795448 0.37563346]
2659 x_new: [[0.34848145 0.59038981 0.37690276]]
2660 fx_new [0.00794592]
2661 Expanding
2662
2663 xs: [[0.34742744 0.59282514 0.37817206]
2664 [0.34934664 0.59128702 0.3787482 ]
2665 [0.34926533 0.59087015 0.37832928]
2666 [0.34816932 0.58835208 0.37459464]
2667 [0.34684183 0.58697818 0.37537262]
2668 [0.35179621 0.5873088 0.37536019]
2669 [0.35073949 0.58536597 0.37266511]]
2670 fxs: [0.00766173 0.00800103 0.00802358 0.00805578 0.00830004 0.00840481
2671 0.00845977]
2672 Centroid: [0.34908375 0.58899819 0.37617744]
2673 x_new: [[0.34742801 0.59263042 0.37968978]]
2674 fx_new [0.00782895]
2675 Back to top
2676
2677 xs: [[0.34742744 0.59282514 0.37817206]
2678 [0.34742801 0.59263042 0.37968978]
2679 [0.34934664 0.59128702 0.3787482 ]
2680 [0.34926533 0.59087015 0.37832928]
2681 [0.34816932 0.58835208 0.37459464]
2682 [0.34684183 0.58697818 0.37537262]
2683 [0.35179621 0.5873088 0.37536019]]
2684 fxs: [0.00766173 0.00782895 0.00800103 0.00802358 0.00805578 0.00830004
2685 0.00840481]
2686 Centroid: [0.34861068 0.59003597 0.37718097]
2687 x_new: [[0.34542516 0.59276314 0.37900174]]
2688 fx_new [0.00769355]
2689 Back to top
2690
2691 xs: [[0.34742744 0.59282514 0.37817206]
2692 [0.34542516 0.59276314 0.37900174]
2693 [0.34742801 0.59263042 0.37968978]
2694 [0.34934664 0.59128702 0.3787482 ]
2695 [0.34926533 0.59087015 0.37832928]
2696 [0.34816932 0.58835208 0.37459464]
2697 [0.34684183 0.58697818 0.37537262]]
2698 fxs: [0.00766173 0.00769355 0.00782895 0.00800103 0.00802358 0.00805578
2699 0.00830004]
2700 Centroid: [0.34770053 0.59081516 0.37770119]
2701 x_new: [[0.34855924 0.59465214 0.38002976]]
2702 fx_new [0.00759848]
2703 Expanding
2704
2705 xs: [[0.34941794 0.59848911 0.38235832]
2706 [0.34742744 0.59282514 0.37817206]
2707 [0.34542516 0.59276314 0.37900174]
2708 [0.34742801 0.59263042 0.37968978]
2709 [0.34934664 0.59128702 0.3787482 ]
2710 [0.34926533 0.59087015 0.37832928]
2711 [0.34816932 0.58835208 0.37459464]]
2712 fxs: [0.00731034 0.00766173 0.00769355 0.00782895 0.00800103 0.00802358

```

```

2713 0.00805578]
2714 Centroid: [0.34806855 0.59245958 0.37869915]
2715 x_new: [[0.34796778 0.59656708 0.38280365]]
2716 fx_new [0.00757543]
2717 Back to top
2718
2719 xs: [[0.34941794 0.59848911 0.38235832]
2720 [0.34796778 0.59656708 0.38280365]
2721 [0.34742744 0.59282514 0.37817206]
2722 [0.34542516 0.59276314 0.37900174]
2723 [0.34742801 0.59263042 0.37968978]
2724 [0.34934664 0.59128702 0.3787482 ]
2725 [0.34926533 0.59087015 0.37832928]]
2726 fxs: [0.00731034 0.00757543 0.00766173 0.00769355 0.00782895 0.00800103
2727 0.00802358]
2728 Centroid: [0.34803976 0.59363315 0.37987186]
2729 x_new: [[0.34681418 0.59639615 0.38141445]]
2730 fx_new [0.00743147]
2731 Back to top
2732
2733 xs: [[0.34941794 0.59848911 0.38235832]
2734 [0.34681418 0.59639615 0.38141445]
2735 [0.34796778 0.59656708 0.38280365]
2736 [0.34742744 0.59282514 0.37817206]
2737 [0.34542516 0.59276314 0.37900174]
2738 [0.34742801 0.59263042 0.37968978]
2739 [0.34934664 0.59128702 0.3787482 ]]
2740 fxs: [0.00731034 0.00743147 0.00757543 0.00766173 0.00769355 0.00782895
2741 0.00800103]
2742 Centroid: [0.34768959 0.59442258 0.3803126 ]
2743 x_new: [[0.34603254 0.59755814 0.381877 ]]
2744 fx_new [0.00729375]
2745 Expanding
2746
2747 xs: [[0.34437549 0.6006937 0.3834414 ]
2748 [0.34941794 0.59848911 0.38235832]
2749 [0.34681418 0.59639615 0.38141445]
2750 [0.34796778 0.59656708 0.38280365]
2751 [0.34742744 0.59282514 0.37817206]
2752 [0.34542516 0.59276314 0.37900174]
2753 [0.34742801 0.59263042 0.37968978]]
2754 fxs: [0.00698518 0.00731034 0.00743147 0.00757543 0.00766173 0.00769355
2755 0.00782895]
2756 Centroid: [0.34697943 0.59576639 0.38098306]
2757 x_new: [[0.34653084 0.59890237 0.38227634]]
2758 fx_new [0.00716159]
2759 Back to top
2760
2761 xs: [[0.34437549 0.6006937 0.3834414 ]
2762 [0.34653084 0.59890237 0.38227634]
2763 [0.34941794 0.59848911 0.38235832]
2764 [0.34681418 0.59639615 0.38141445]
2765 [0.34796778 0.59656708 0.38280365]
2766 [0.34742744 0.59282514 0.37817206]
2767 [0.34542516 0.59276314 0.37900174]]
2768 fxs: [0.00698518 0.00716159 0.00731034 0.00743147 0.00757543 0.00766173
2769 0.00769355]
2770 Centroid: [0.34685126 0.59666238 0.38135257]
2771 x_new: [[0.34827737 0.60056163 0.38370339]]
2772 fx_new [0.00713034]
2773 Back to top
2774
2775 xs: [[0.34437549 0.6006937 0.3834414 ]
2776 [0.34827737 0.60056163 0.38370339]
2777 [0.34653084 0.59890237 0.38227634]
2778 [0.34941794 0.59848911 0.38235832]
2779 [0.34681418 0.59639615 0.38141445]
2780 [0.34796778 0.59656708 0.38280365]
2781 [0.34742744 0.59282514 0.37817206]]
2782 fxs: [0.00698518 0.00713034 0.00716159 0.00731034 0.00743147 0.00757543

```



```

2783 0.00766173]
2784 Centroid: [0.34725872 0.59777645 0.38202423]
2785 x_new: [[0.34709 0.60272777 0.3858764 ]]
2786 fx_new [0.0070382]
2787 Back to top
2788
2789 xs: [[0.34437549 0.6006937 0.3834414 ]
2790 [0.34709 0.60272777 0.3858764 ]
2791 [0.34827737 0.60056163 0.38370339]
2792 [0.34653084 0.59890237 0.38227634]
2793 [0.34941794 0.59848911 0.38235832]
2794 [0.34681418 0.59639615 0.38141445]
2795 [0.34796778 0.59656708 0.38280365]]
2796 fxs: [0.00698518 0.0070382 0.00713034 0.00716159 0.00731034 0.00743147
2797 0.00757543]
2798 Centroid: [0.34721051 0.59919112 0.38312485]
2799 x_new: [[0.34645325 0.60181515 0.38344605]]
2800 fx_new [0.00688914]
2801 Expanding
2802
2803 xs: [[0.34569599 0.60443918 0.38376724]
2804 [0.34437549 0.6006937 0.3834414 ]
2805 [0.34709 0.60272777 0.3858764 ]
2806 [0.34827737 0.60056163 0.38370339]
2807 [0.34653084 0.59890237 0.38227634]
2808 [0.34941794 0.59848911 0.38235832]
2809 [0.34681418 0.59639615 0.38141445]]
2810 fxs: [0.00656867 0.00698518 0.0070382 0.00713034 0.00716159 0.00731034
2811 0.00743147]
2812 Centroid: [0.34688597 0.6003157 0.38326251]
2813 x_new: [[0.34695777 0.60423525 0.38511056]]
2814 fx_new [0.00676419]
2815 Back to top
2816
2817 xs: [[0.34569599 0.60443918 0.38376724]
2818 [0.34695777 0.60423525 0.38511056]
2819 [0.34437549 0.6006937 0.3834414 ]
2820 [0.34709 0.60272777 0.3858764 ]
2821 [0.34827737 0.60056163 0.38370339]
2822 [0.34653084 0.59890237 0.38227634]
2823 [0.34941794 0.59848911 0.38235832]]
2824 fxs: [0.00656867 0.00676419 0.00698518 0.0070382 0.00713034 0.00716159
2825 0.00731034]
2826 Centroid: [0.34690649 0.60143557 0.38379052]
2827 x_new: [[0.34439503 0.60438203 0.38522272]]
2828 fx_new [0.00669425]
2829 Back to top
2830
2831 xs: [[0.34569599 0.60443918 0.38376724]
2832 [0.34439503 0.60438203 0.38522272]
2833 [0.34695777 0.60423525 0.38511056]
2834 [0.34437549 0.6006937 0.3834414 ]
2835 [0.34709 0.60272777 0.3858764 ]
2836 [0.34827737 0.60056163 0.38370339]
2837 [0.34653084 0.59890237 0.38227634]]
2838 fxs: [0.00656867 0.00669425 0.00676419 0.00698518 0.0070382 0.00713034
2839 0.00716159]
2840 Centroid: [0.34618893 0.60227742 0.38419972]
2841 x_new: [[0.34584701 0.60565247 0.3861231 ]]
2842 fx_new [0.00666608]
2843 Back to top
2844
2845 xs: [[0.34569599 0.60443918 0.38376724]
2846 [0.34584701 0.60565247 0.3861231 ]
2847 [0.34439503 0.60438203 0.38522272]
2848 [0.34695777 0.60423525 0.38511056]
2849 [0.34437549 0.6006937 0.3834414 ]
2850 [0.34709 0.60272777 0.3858764 ]
2851 [0.34827737 0.60056163 0.38370339]]
2852 fxs: [0.00656867 0.00666608 0.00669425 0.00676419 0.00698518 0.0070382

```

```

2853 0.00713034]
2854 Centroid: [0.34609124 0.60324172 0.38474926]
2855 x_new: [[0.34390511 0.60592181 0.38579513]]
2856 fx_new [0.00655394]
2857 Expanding
2858
2859 xs: [[0.34171898 0.6086019 0.386841 ]
2860 [0.34569599 0.60443918 0.38376724]
2861 [0.34584701 0.60565247 0.3861231 ]
2862 [0.34439503 0.60438203 0.38522272]
2863 [0.34695777 0.60423525 0.38511056]
2864 [0.34437549 0.6006937 0.3834414 ]
2865 [0.34709 0.60272777 0.3858764 ]]
2866 fxs: [0.00630491 0.00656867 0.00666608 0.00669425 0.00676419 0.00698518
2867 0.0070382 ]
2868 Centroid: [0.34515433 0.60439033 0.38519749]
2869 x_new: [[0.34321865 0.60605289 0.38451858]]
2870 fx_new [0.00639168]
2871 Back to top
2872
2873 xs: [[0.34171898 0.6086019 0.386841 ]
2874 [0.34321865 0.60605289 0.38451858]
2875 [0.34569599 0.60443918 0.38376724]
2876 [0.34584701 0.60565247 0.3861231 ]
2877 [0.34439503 0.60438203 0.38522272]
2878 [0.34695777 0.60423525 0.38511056]
2879 [0.34437549 0.6006937 0.3834414 ]]
2880 fxs: [0.00630491 0.00639168 0.00656867 0.00666608 0.00669425 0.00676419
2881 0.00698518]
2882 Centroid: [0.34460128 0.60486535 0.38500352]
2883 x_new: [[0.34482706 0.60903699 0.38656563]]
2884 fx_new [0.00628696]
2885 Expanding
2886
2887 xs: [[0.34505284 0.61320864 0.38812775]
2888 [0.34171898 0.6086019 0.386841 ]
2889 [0.34321865 0.60605289 0.38451858]
2890 [0.34569599 0.60443918 0.38376724]
2891 [0.34584701 0.60565247 0.3861231 ]
2892 [0.34439503 0.60438203 0.38522272]
2893 [0.34695777 0.60423525 0.38511056]]
2894 fxs: [0.00599754 0.00630491 0.00639168 0.00656867 0.00666608 0.00669425
2895 0.00676419]
2896 Centroid: [0.34469804 0.6066532 0.38567299]
2897 x_new: [[0.34243831 0.60907114 0.38623543]]
2898 fx_new [0.00619878]
2899 Back to top
2900
2901 xs: [[0.34505284 0.61320864 0.38812775]
2902 [0.34243831 0.60907114 0.38623543]
2903 [0.34171898 0.6086019 0.386841 ]
2904 [0.34321865 0.60605289 0.38451858]
2905 [0.34569599 0.60443918 0.38376724]
2906 [0.34584701 0.60565247 0.3861231 ]
2907 [0.34439503 0.60438203 0.38522272]]
2908 fxs: [0.00599754 0.00619878 0.00630491 0.00639168 0.00656867 0.00666608
2909 0.00669425]
2910 Centroid: [0.3440524 0.60734404 0.38583369]
2911 x_new: [[0.34370977 0.61030604 0.38644466]]
2912 fx_new [0.006105]
2913 Back to top
2914
2915 xs: [[0.34505284 0.61320864 0.38812775]
2916 [0.34370977 0.61030604 0.38644466]
2917 [0.34243831 0.60907114 0.38623543]
2918 [0.34171898 0.6086019 0.386841 ]
2919 [0.34321865 0.60605289 0.38451858]
2920 [0.34569599 0.60443918 0.38376724]
2921 [0.34584701 0.60565247 0.3861231 ]]
2922 fxs: [0.00599754 0.006105 0.00619878 0.00630491 0.00639168 0.00656867

```

```

2923 0.00666608]
2924 Centroid: [0.34395451 0.60819032 0.38600825]
2925 x_new: [[0.342062 0.61072818 0.3858934 ]]
2926 fx_new [0.00596786]
2927 Expanding
2928
2929 xs: [[0.3401695 0.61326603 0.38577855]
2930 [0.34505284 0.61320864 0.38812775]
2931 [0.34370977 0.61030604 0.38644466]
2932 [0.34243831 0.60907114 0.38623543]
2933 [0.34171898 0.6086019 0.386841 ]
2934 [0.34321865 0.60605289 0.38451858]
2935 [0.34569599 0.60443918 0.38376724]]
2936 fxs: [0.00564886 0.00599754 0.006105 0.00619878 0.00630491 0.00639168
2937 0.00656867]
2938 Centroid: [0.34314344 0.60927797 0.38595903]
2939 x_new: [[0.34059088 0.61411677 0.38815082]]
2940 fx_new [0.00581912]
2941 Back to top
2942
2943 xs: [[0.3401695 0.61326603 0.38577855]
2944 [0.34059088 0.61411677 0.38815082]
2945 [0.34505284 0.61320864 0.38812775]
2946 [0.34370977 0.61030604 0.38644466]
2947 [0.34243831 0.60907114 0.38623543]
2948 [0.34171898 0.6086019 0.386841 ]
2949 [0.34321865 0.60605289 0.38451858]]
2950 fxs: [0.00564886 0.00581912 0.00599754 0.006105 0.00619878 0.00630491
2951 0.00639168]
2952 Centroid: [0.34241413 0.61066049 0.38658525]
2953 x_new: [[0.34160962 0.61526809 0.38865193]]
2954 fx_new [0.00577046]
2955 Back to top
2956
2957 xs: [[0.3401695 0.61326603 0.38577855]
2958 [0.34160962 0.61526809 0.38865193]
2959 [0.34059088 0.61411677 0.38815082]
2960 [0.34505284 0.61320864 0.38812775]
2961 [0.34370977 0.61030604 0.38644466]
2962 [0.34243831 0.60907114 0.38623543]
2963 [0.34171898 0.6086019 0.386841 ]]
2964 fxs: [0.00564886 0.00577046 0.00581912 0.00599754 0.006105 0.00619878
2965 0.00630491]
2966 Centroid: [0.34218427 0.61197694 0.38717573]
2967 x_new: [[0.34264956 0.61535199 0.38751046]]
2968 fx_new [0.00565515]
2969 Back to top
2970
2971 xs: [[0.3401695 0.61326603 0.38577855]
2972 [0.34264956 0.61535199 0.38751046]
2973 [0.34160962 0.61526809 0.38865193]
2974 [0.34059088 0.61411677 0.38815082]
2975 [0.34505284 0.61320864 0.38812775]
2976 [0.34370977 0.61030604 0.38644466]
2977 [0.34243831 0.60907114 0.38623543]]
2978 fxs: [0.00564886 0.00565515 0.00577046 0.00581912 0.00599754 0.006105
2979 0.00619878]
2980 Centroid: [0.34231721 0.61294124 0.38727137]
2981 x_new: [[0.34219611 0.61681134 0.38830731]]
2982 fx_new [0.00558624]
2983 Expanding
2984
2985 xs: [[0.34207501 0.62068145 0.38934326]
2986 [0.3401695 0.61326603 0.38577855]
2987 [0.34264956 0.61535199 0.38751046]
2988 [0.34160962 0.61526809 0.38865193]
2989 [0.34059088 0.61411677 0.38815082]
2990 [0.34505284 0.61320864 0.38812775]
2991 [0.34370977 0.61030604 0.38644466]]
2992 fxs: [0.00532817 0.00564886 0.00565515 0.00577046 0.00581912 0.00599754

```

```

2993 0.006105 ]
2994 Centroid: [0.34226531 0.61459986 0.38771535]
2995 x_new: [[0.34082085 0.61889367 0.38898603]]
2996 fx_new [0.00543554]
2997 Back to top
2998
2999 xs: [[0.34207501 0.62068145 0.38934326]
3000 [0.34082085 0.61889367 0.38898603]
3001 [0.3401695 0.61326603 0.38577855]
3002 [0.34264956 0.61535199 0.38751046]
3003 [0.34160962 0.61526809 0.38865193]
3004 [0.34059088 0.61411677 0.38815082]
3005 [0.34505284 0.61320864 0.38812775]]
3006 fxs: [0.00532817 0.00543554 0.00564886 0.00565515 0.00577046 0.00581912
3007 0.00599754]
3008 Centroid: [0.34185261 0.61582666 0.3880784 ]
3009 x_new: [[0.33865238 0.61844468 0.38802905]]
3010 fx_new [0.00534527]
3011 Back to top
3012
3013 xs: [[0.34207501 0.62068145 0.38934326]
3014 [0.33865238 0.61844468 0.38802905]
3015 [0.34082085 0.61889367 0.38898603]
3016 [0.3401695 0.61326603 0.38577855]
3017 [0.34264956 0.61535199 0.38751046]
3018 [0.34160962 0.61526809 0.38865193]
3019 [0.34059088 0.61411677 0.38815082]]
3020 fxs: [0.00532817 0.00534527 0.00543554 0.00564886 0.00565515 0.00577046
3021 0.00581912]
3022 Centroid: [0.34093826 0.61657467 0.3880643 ]
3023 x_new: [[0.34128564 0.61903257 0.38797778]]
3024 fx_new [0.00531826]
3025 Expanding
3026
3027 xs: [[0.34163301 0.62149047 0.38789126]
3028 [0.34207501 0.62068145 0.38934326]
3029 [0.33865238 0.61844468 0.38802905]
3030 [0.34082085 0.61889367 0.38898603]
3031 [0.3401695 0.61326603 0.38577855]
3032 [0.34264956 0.61535199 0.38751046]
3033 [0.34160962 0.61526809 0.38865193]]
3034 fxs: [0.00508634 0.00532817 0.00534527 0.00543554 0.00564886 0.00565515
3035 0.00577046]
3036 Centroid: [0.34108713 0.61762805 0.38802722]
3037 x_new: [[0.34056465 0.61998802 0.38740251]]
3038 fx_new [0.00515466]
3039 Back to top
3040
3041 xs: [[0.34163301 0.62149047 0.38789126]
3042 [0.34056465 0.61998802 0.38740251]
3043 [0.34207501 0.62068145 0.38934326]
3044 [0.33865238 0.61844468 0.38802905]
3045 [0.34082085 0.61889367 0.38898603]
3046 [0.3401695 0.61326603 0.38577855]
3047 [0.34264956 0.61535199 0.38751046]]
3048 fxs: [0.00508634 0.00515466 0.00532817 0.00534527 0.00543554 0.00564886
3049 0.00565515]
3050 Centroid: [0.34093785 0.61830233 0.38784873]
3051 x_new: [[0.33922614 0.62125267 0.388187 ]]
3052 fx_new [0.00510608]
3053 Back to top
3054
3055 xs: [[0.34163301 0.62149047 0.38789126]
3056 [0.33922614 0.62125267 0.388187 ]
3057 [0.34056465 0.61998802 0.38740251]
3058 [0.34207501 0.62068145 0.38934326]
3059 [0.33865238 0.61844468 0.38802905]
3060 [0.34082085 0.61889367 0.38898603]
3061 [0.3401695 0.61326603 0.38577855]]
3062 fxs: [0.00508634 0.00510608 0.00515466 0.00532817 0.00534527 0.00543554

```

```

3063 0.00564886]
3064 Centroid: [0.34044879 0.61914528 0.38794538]
3065 x_new: [[0.34072809 0.62502454 0.39011221]]
3066 fx_new [0.00501259]
3067 Expanding
3068
3069 xs: [[0.34100738 0.63090379 0.39227905]
3070 [0.34163301 0.62149047 0.38789126]
3071 [0.33922614 0.62125267 0.388187 ]
3072 [0.34056465 0.61998802 0.38740251]
3073 [0.34207501 0.62068145 0.38934326]
3074 [0.33865238 0.61844468 0.38802905]
3075 [0.34082085 0.61889367 0.38898603]]
3076 fxs: [0.00481247 0.00508634 0.00510608 0.00515466 0.00532817 0.00534527
3077 0.00543554]
3078 Centroid: [0.34056849 0.62166496 0.38887402]
3079 x_new: [[0.34031613 0.62443626 0.38876201]]
3080 fx_new [0.00490451]
3081 Back to top
3082
3083 xs: [[0.34100738 0.63090379 0.39227905]
3084 [0.34031613 0.62443626 0.38876201]
3085 [0.34163301 0.62149047 0.38789126]
3086 [0.33922614 0.62125267 0.388187 ]
3087 [0.34056465 0.61998802 0.38740251]
3088 [0.34207501 0.62068145 0.38934326]
3089 [0.33865238 0.61844468 0.38802905]]
3090 fxs: [0.00481247 0.00490451 0.00508634 0.00510608 0.00515466 0.00532817
3091 0.00534527]
3092 Centroid: [0.34049639 0.62245676 0.38884202]
3093 x_new: [[0.34234039 0.62646884 0.38965499]]
3094 fx_new [0.00486912]
3095 Back to top
3096
3097 xs: [[0.34100738 0.63090379 0.39227905]
3098 [0.34234039 0.62646884 0.38965499]
3099 [0.34031613 0.62443626 0.38876201]
3100 [0.34163301 0.62149047 0.38789126]
3101 [0.33922614 0.62125267 0.388187 ]
3102 [0.34056465 0.61998802 0.38740251]
3103 [0.34207501 0.62068145 0.38934326]]
3104 fxs: [0.00481247 0.00486912 0.00490451 0.00508634 0.00510608 0.00515466
3105 0.00532817]
3106 Centroid: [0.34102325 0.62360307 0.3890743 ]
3107 x_new: [[0.33997148 0.62652469 0.38880534]]
3108 fx_new [0.00473259]
3109 Expanding
3110
3111 xs: [[0.33891971 0.62944632 0.38853638]
3112 [0.34100738 0.63090379 0.39227905]
3113 [0.34234039 0.62646884 0.38965499]
3114 [0.34031613 0.62443626 0.38876201]
3115 [0.34163301 0.62149047 0.38789126]
3116 [0.33922614 0.62125267 0.388187 ]
3117 [0.34056465 0.61998802 0.38740251]]
3118 fxs: [0.00446394 0.00481247 0.00486912 0.00490451 0.00508634 0.00510608
3119 0.00515466]
3120 Centroid: [0.34057249 0.62485519 0.38895903]
3121 x_new: [[0.34058033 0.62972237 0.39051555]]
3122 fx_new [0.00468721]
3123 Back to top
3124
3125 xs: [[0.33891971 0.62944632 0.38853638]
3126 [0.34058033 0.62972237 0.39051555]
3127 [0.34100738 0.63090379 0.39227905]
3128 [0.34234039 0.62646884 0.38965499]
3129 [0.34031613 0.62443626 0.38876201]
3130 [0.34163301 0.62149047 0.38789126]
3131 [0.33922614 0.62125267 0.388187 ]]
3132 fxs: [0.00446394 0.00468721 0.00481247 0.00486912 0.00490451 0.00508634

```

```

3133 0.00510608]
3134 Centroid: [0.34057473 0.62624582 0.38940375]
3135 x_new: [[0.34192331 0.63123896 0.3906205 ]]
3136 fx_new [0.00461073]
3137 Back to top
3138
3139 xs: [[0.33891971 0.62944632 0.38853638]
3140 [0.34192331 0.63123896 0.3906205 ]
3141 [0.34058033 0.62972237 0.39051555]
3142 [0.34100738 0.63090379 0.39227905]
3143 [0.34234039 0.62646884 0.38965499]
3144 [0.34031613 0.62443626 0.38876201]
3145 [0.34163301 0.62149047 0.38789126]]
3146 fxs: [0.00446394 0.00461073 0.00468721 0.00481247 0.00486912 0.00490451
3147 0.00508634]
3148 Centroid: [0.34096004 0.62767243 0.38975139]
3149 x_new: [[0.34028706 0.63385439 0.39161152]]
3150 fx_new [0.00452135]
3151 Back to top
3152
3153 xs: [[0.33891971 0.62944632 0.38853638]
3154 [0.34028706 0.63385439 0.39161152]
3155 [0.34192331 0.63123896 0.3906205 ]
3156 [0.34058033 0.62972237 0.39051555]
3157 [0.34100738 0.63090379 0.39227905]
3158 [0.34234039 0.62646884 0.38965499]
3159 [0.34031613 0.62443626 0.38876201]]
3160 fxs: [0.00446394 0.00452135 0.00461073 0.00468721 0.00481247 0.00486912
3161 0.00490451]
3162 Centroid: [0.34076776 0.62943871 0.39028286]
3163 x_new: [[0.34121939 0.63444115 0.3918037 ]]
3164 fx_new [0.00451946]
3165 Back to top
3166
3167 xs: [[0.33891971 0.62944632 0.38853638]
3168 [0.34121939 0.63444115 0.3918037 ]
3169 [0.34028706 0.63385439 0.39161152]
3170 [0.34192331 0.63123896 0.3906205 ]
3171 [0.34058033 0.62972237 0.39051555]
3172 [0.34100738 0.63090379 0.39227905]
3173 [0.34234039 0.62646884 0.38965499]]
3174 fxs: [0.00446394 0.00451946 0.00452135 0.00461073 0.00468721 0.00481247
3175 0.00486912]
3176 Centroid: [0.3408968 0.63086798 0.39071738]
3177 x_new: [[0.3394532 0.63526711 0.39177978]]
3178 fx_new [0.00443937]
3179 Expanding
3180
3181 xs: [[0.3380096 0.63966624 0.39284217]
3182 [0.33891971 0.62944632 0.38853638]
3183 [0.34121939 0.63444115 0.3918037 ]
3184 [0.34028706 0.63385439 0.39161152]
3185 [0.34192331 0.63123896 0.3906205 ]
3186 [0.34058033 0.62972237 0.39051555]
3187 [0.34100738 0.63090379 0.39227905]]
3188 fxs: [0.00429219 0.00446394 0.00451946 0.00452135 0.00461073 0.00468721
3189 0.00481247]
3190 Centroid: [0.34027811 0.63275332 0.3911727 ]
3191 x_new: [[0.33954884 0.63460285 0.39006634]]
3192 fx_new [0.00428536]
3193 Expanding
3194
3195 xs: [[0.33881958 0.63645237 0.38895999]
3196 [0.3380096 0.63966624 0.39284217]
3197 [0.33891971 0.62944632 0.38853638]
3198 [0.34121939 0.63444115 0.3918037 ]
3199 [0.34028706 0.63385439 0.39161152]
3200 [0.34192331 0.63123896 0.3906205 ]
3201 [0.34058033 0.62972237 0.39051555]]
3202 fxs: [0.00403733 0.00429219 0.00446394 0.00451946 0.00452135 0.00461073

```

```

3203 0.00468721]
3204 Centroid: [0.33996557 0.63354597 0.39069854]
3205 x_new: [[0.33935081 0.63736958 0.39088154]]
3206 fx_new [0.00420633]
3207 Back to top
3208
3209 xs: [[0.33881958 0.63645237 0.38895999]
3210 [0.33935081 0.63736958 0.39088154]
3211 [0.3380096 0.63966624 0.39284217]
3212 [0.33891971 0.62944632 0.38853638]
3213 [0.34121939 0.63444115 0.3918037 ]
3214 [0.34028706 0.63385439 0.39161152]
3215 [0.34192331 0.63123896 0.3906205 ]]
3216 fxs: [0.00403733 0.00420633 0.00429219 0.00446394 0.00451946 0.00452135
3217 0.00461073]
3218 Centroid: [0.33978992 0.63463843 0.39075083]
3219 x_new: [[0.33765653 0.6380379 0.39088116]]
3220 fx_new [0.00415005]
3221 Back to top
3222
3223 xs: [[0.33881958 0.63645237 0.38895999]
3224 [0.33765653 0.6380379 0.39088116]
3225 [0.33935081 0.63736958 0.39088154]
3226 [0.3380096 0.63966624 0.39284217]
3227 [0.33891971 0.62944632 0.38853638]
3228 [0.34121939 0.63444115 0.3918037 ]
3229 [0.34028706 0.63385439 0.39161152]]
3230 fxs: [0.00403733 0.00415005 0.00420633 0.00429219 0.00446394 0.00451946
3231 0.00452135]
3232 Centroid: [0.33918038 0.63560971 0.39078807]
3233 x_new: [[0.33807371 0.63736502 0.38996461]]
3234 fx_new [0.00408816]
3235 Back to top
3236
3237 xs: [[0.33881958 0.63645237 0.38895999]
3238 [0.33807371 0.63736502 0.38996461]
3239 [0.33765653 0.6380379 0.39088116]
3240 [0.33935081 0.63736958 0.39088154]
3241 [0.3380096 0.63966624 0.39284217]
3242 [0.33891971 0.62944632 0.38853638]
3243 [0.34121939 0.63444115 0.3918037 ]]
3244 fxs: [0.00403733 0.00408816 0.00415005 0.00420633 0.00429219 0.00446394
3245 0.00451946]
3246 Centroid: [0.33886419 0.63611123 0.39055279]
3247 x_new: [[0.33650899 0.6377813 0.38930188]]
3248 fx_new [0.00397693]
3249 Expanding
3250
3251 xs: [[0.33415379 0.63945137 0.38805097]
3252 [0.33881958 0.63645237 0.38895999]
3253 [0.33807371 0.63736502 0.38996461]
3254 [0.33765653 0.6380379 0.39088116]
3255 [0.33935081 0.63736958 0.39088154]
3256 [0.3380096 0.63966624 0.39284217]
3257 [0.33891971 0.62944632 0.38853638]]
3258 fxs: [0.00373537 0.00403733 0.00408816 0.00415005 0.00420633 0.00429219
3259 0.00446394]
3260 Centroid: [0.33785482 0.63682697 0.39001669]
3261 x_new: [[0.33678993 0.64420763 0.391497 ]]
3262 fx_new [0.00389937]
3263 Back to top
3264
3265 xs: [[0.33415379 0.63945137 0.38805097]
3266 [0.33678993 0.64420763 0.391497 ]
3267 [0.33881958 0.63645237 0.38895999]
3268 [0.33807371 0.63736502 0.38996461]
3269 [0.33765653 0.6380379 0.39088116]
3270 [0.33935081 0.63736958 0.39088154]
3271 [0.3380096 0.63966624 0.39284217]]
3272 fxs: [0.00373537 0.00389937 0.00403733 0.00408816 0.00415005 0.00420633

```

```

3273 0.00429219]
3274 Centroid: [0.33755056 0.63893573 0.39043963]
3275 x_new: [[0.33709153 0.63820522 0.3880371 ]]
3276 fx_new [0.00381668]
3277 Back to top
3278
3279 xs: [[0.33415379 0.63945137 0.38805097]
3280 [0.33709153 0.63820522 0.3880371 ]
3281 [0.33678993 0.64420763 0.391497 ]
3282 [0.33881958 0.63645237 0.38895999]
3283 [0.33807371 0.63736502 0.38996461]
3284 [0.33765653 0.6380379 0.39088116]
3285 [0.33935081 0.63736958 0.39088154]]
3286 fxs: [0.00373537 0.00381668 0.00389937 0.00403733 0.00408816 0.00415005
3287 0.00420633]
3288 Centroid: [0.33741941 0.63872701 0.38975319]
3289 x_new: [[0.33548801 0.64008445 0.38862485]]
3290 fx_new [0.00376841]
3291 Back to top
3292
3293 xs: [[0.33415379 0.63945137 0.38805097]
3294 [0.33548801 0.64008445 0.38862485]
3295 [0.33709153 0.63820522 0.3880371 ]
3296 [0.33678993 0.64420763 0.391497 ]
3297 [0.33881958 0.63645237 0.38895999]
3298 [0.33807371 0.63736502 0.38996461]
3299 [0.33765653 0.6380379 0.39088116]]
3300 fxs: [0.00373537 0.00376841 0.00381668 0.00389937 0.00403733 0.00408816
3301 0.00415005]
3302 Centroid: [0.33686758 0.63911485 0.38943081]
3303 x_new: [[0.33607863 0.6401918 0.38798046]]
3304 fx_new [0.00369476]
3305 Expanding
3306
3307 xs: [[0.33528968 0.64126875 0.38653012]
3308 [0.33415379 0.63945137 0.38805097]
3309 [0.33548801 0.64008445 0.38862485]
3310 [0.33709153 0.63820522 0.3880371 ]
3311 [0.33678993 0.64420763 0.391497 ]
3312 [0.33881958 0.63645237 0.38895999]
3313 [0.33807371 0.63736502 0.38996461]]
3314 fxs: [0.00347878 0.00373537 0.00376841 0.00381668 0.00389937 0.00403733
3315 0.00408816]
3316 Centroid: [0.33652946 0.6395764 0.38880923]
3317 x_new: [[0.33498521 0.64178778 0.38765386]]
3318 fx_new [0.00357241]
3319 Back to top
3320
3321 xs: [[0.33528968 0.64126875 0.38653012]
3322 [0.33498521 0.64178778 0.38765386]
3323 [0.33415379 0.63945137 0.38805097]
3324 [0.33548801 0.64008445 0.38862485]
3325 [0.33709153 0.63820522 0.3880371 ]
3326 [0.33678993 0.64420763 0.391497 ]
3327 [0.33881958 0.63645237 0.38895999]]
3328 fxs: [0.00347878 0.00357241 0.00373537 0.00376841 0.00381668 0.00389937
3329 0.00403733]
3330 Centroid: [0.33608825 0.64020822 0.38847913]
3331 x_new: [[0.33335691 0.64396408 0.38799826]]
3332 fx_new [0.00350366]
3333 Back to top
3334
3335 xs: [[0.33528968 0.64126875 0.38653012]
3336 [0.33335691 0.64396408 0.38799826]
3337 [0.33498521 0.64178778 0.38765386]
3338 [0.33415379 0.63945137 0.38805097]
3339 [0.33548801 0.64008445 0.38862485]
3340 [0.33709153 0.63820522 0.3880371 ]
3341 [0.33678993 0.64420763 0.391497 ]]
3342 fxs: [0.00347878 0.00350366 0.00357241 0.00373537 0.00376841 0.00381668

```



```

3343 0.00389937]
3344 Centroid: [0.33530787 0.64128132 0.38834174]
3345 x_new: [[0.3338258 0.63835502 0.38518648]]
3346 fx_new [0.00349054]
3347 Back to top
3348
3349 xs: [[0.33528968 0.64126875 0.38653012]
3350 [0.3338258 0.63835502 0.38518648]
3351 [0.33335691 0.64396408 0.38799826]
3352 [0.33498521 0.64178778 0.38765386]
3353 [0.33415379 0.63945137 0.38805097]
3354 [0.33548801 0.64008445 0.38862485]
3355 [0.33709153 0.63820522 0.3880371 ]]
3356 fxs: [0.00347878 0.00349054 0.00350366 0.00357241 0.00373537 0.00376841
3357 0.00381668]
3358 Centroid: [0.33488442 0.64044524 0.38744023]
3359 x_new: [[0.33267731 0.64268526 0.38684337]]
3360 fx_new [0.00343886]
3361 Expanding
3362
3363 xs: [[0.3304702 0.64492528 0.3862465 ]
3364 [0.33528968 0.64126875 0.38653012]
3365 [0.3338258 0.63835502 0.38518648]
3366 [0.33335691 0.64396408 0.38799826]
3367 [0.33498521 0.64178778 0.38765386]
3368 [0.33415379 0.63945137 0.38805097]
3369 [0.33548801 0.64008445 0.38862485]]
3370 fxs: [0.00328069 0.00347878 0.00349054 0.00350366 0.00357241 0.00373537
3371 0.00376841]
3372 Centroid: [0.33393852 0.64140525 0.38718443]
3373 x_new: [[0.33238902 0.64272605 0.38574402]]
3374 fx_new [0.00332092]
3375 Back to top
3376
3377 xs: [[0.3304702 0.64492528 0.3862465 ]
3378 [0.33238902 0.64272605 0.38574402]
3379 [0.33528968 0.64126875 0.38653012]
3380 [0.3338258 0.63835502 0.38518648]
3381 [0.33335691 0.64396408 0.38799826]
3382 [0.33498521 0.64178778 0.38765386]
3383 [0.33415379 0.63945137 0.38805097]]
3384 fxs: [0.00328069 0.00332092 0.00347878 0.00349054 0.00350366 0.00357241
3385 0.00373537]
3386 Centroid: [0.3334958 0.64178262 0.38677289]
3387 x_new: [[0.33283782 0.64411387 0.3854948 ]]
3388 fx_new [0.00322969]
3389 Expanding
3390
3391 xs: [[0.33217983 0.64644511 0.38421671]
3392 [0.3304702 0.64492528 0.3862465 ]
3393 [0.33238902 0.64272605 0.38574402]
3394 [0.33528968 0.64126875 0.38653012]
3395 [0.3338258 0.63835502 0.38518648]
3396 [0.33335691 0.64396408 0.38799826]
3397 [0.33498521 0.64178778 0.38765386]]
3398 fxs: [0.00299936 0.00328069 0.00332092 0.00347878 0.00349054 0.00350366
3399 0.00357241]
3400 Centroid: [0.33321381 0.64278172 0.38622513]
3401 x_new: [[0.33144241 0.64377567 0.38479641]]
3402 fx_new [0.00317602]
3403 Back to top
3404
3405 xs: [[0.33217983 0.64644511 0.38421671]
3406 [0.33144241 0.64377567 0.38479641]
3407 [0.3304702 0.64492528 0.3862465 ]
3408 [0.33238902 0.64272605 0.38574402]
3409 [0.33528968 0.64126875 0.38653012]
3410 [0.3338258 0.63835502 0.38518648]
3411 [0.33335691 0.64396408 0.38799826]]
3412 fxs: [0.00299936 0.00317602 0.00328069 0.00332092 0.00347878 0.00349054

```

```

3413 0.00350366]
3414 Centroid: [0.33270769 0.64306571 0.38581693]
3415 x_new: [[0.33205847 0.64216734 0.38363559]]
3416 fx_new [0.00313216]
3417 Back to top
3418
3419 xs: [[0.33217983 0.64644511 0.38421671]
3420 [0.33205847 0.64216734 0.38363559]
3421 [0.33144241 0.64377567 0.38479641]
3422 [0.3304702 0.64492528 0.3862465 ]
3423 [0.33238902 0.64272605 0.38574402]
3424 [0.33528968 0.64126875 0.38653012]
3425 [0.3338258 0.63835502 0.38518648]]
3426 fxs: [0.00299936 0.00313216 0.00317602 0.00328069 0.00332092 0.00347878
3427 0.00349054]
3428 Centroid: [0.3325222 0.64280903 0.38519369]
3429 x_new: [[0.3312186 0.64726304 0.3852009 ]]
3430 fx_new [0.00307122]
3431 Back to top
3432
3433 xs: [[0.33217983 0.64644511 0.38421671]
3434 [0.3312186 0.64726304 0.3852009 ]
3435 [0.33205847 0.64216734 0.38363559]
3436 [0.33144241 0.64377567 0.38479641]
3437 [0.3304702 0.64492528 0.3862465 ]
3438 [0.33238902 0.64272605 0.38574402]
3439 [0.33528968 0.64126875 0.38653012]]
3440 fxs: [0.00299936 0.00307122 0.00313216 0.00317602 0.00328069 0.00332092
3441 0.00347878]
3442 Centroid: [0.33214975 0.64408161 0.38519575]
3443 x_new: [[0.32900981 0.64689446 0.38386139]]
3444 fx_new [0.00296272]
3445 Expanding
3446
3447 xs: [[0.32586988 0.64970731 0.38252702]
3448 [0.33217983 0.64644511 0.38421671]
3449 [0.3312186 0.64726304 0.3852009 ]
3450 [0.33205847 0.64216734 0.38363559]
3451 [0.33144241 0.64377567 0.38479641]
3452 [0.3304702 0.64492528 0.3862465 ]
3453 [0.33238902 0.64272605 0.38574402]]
3454 fxs: [0.00276334 0.00299936 0.00307122 0.00313216 0.00317602 0.00328069
3455 0.00332092]
3456 Centroid: [0.33080406 0.64528711 0.38462388]
3457 x_new: [[0.3292191 0.64784818 0.38350374]]
3458 fx_new [0.00288813]
3459 Back to top
3460
3461 xs: [[0.32586988 0.64970731 0.38252702]
3462 [0.3292191 0.64784818 0.38350374]
3463 [0.33217983 0.64644511 0.38421671]
3464 [0.3312186 0.64726304 0.3852009 ]
3465 [0.33205847 0.64216734 0.38363559]
3466 [0.33144241 0.64377567 0.38479641]
3467 [0.3304702 0.64492528 0.3862465 ]]
3468 fxs: [0.00276334 0.00288813 0.00299936 0.00307122 0.00313216 0.00317602
3469 0.00328069]
3470 Centroid: [0.33035121 0.64601885 0.38430384]
3471 x_new: [[0.33023222 0.64711242 0.38236118]]
3472 fx_new [0.00279572]
3473 Back to top
3474
3475 xs: [[0.32586988 0.64970731 0.38252702]
3476 [0.33023222 0.64711242 0.38236118]
3477 [0.3292191 0.64784818 0.38350374]
3478 [0.33217983 0.64644511 0.38421671]
3479 [0.3312186 0.64726304 0.3852009 ]
3480 [0.33205847 0.64216734 0.38363559]
3481 [0.33144241 0.64377567 0.38479641]]
3482 fxs: [0.00276334 0.00279572 0.00288813 0.00299936 0.00307122 0.00313216

```

```

3483 0.00317602]
3484 Centroid: [0.33031722 0.6463313 0.3837488 ]
3485 x_new: [[0.32919203 0.64888693 0.38270118]]
3486 fx_new [0.00277045]
3487 Back to top
3488
3489 xs: [[0.32586988 0.64970731 0.38252702]
3490 [0.32919203 0.64888693 0.38270118]
3491 [0.33023222 0.64711242 0.38236118]
3492 [0.3292191 0.64784818 0.38350374]
3493 [0.33217983 0.64644511 0.38421671]
3494 [0.3312186 0.64726304 0.3852009 ]
3495 [0.33205847 0.64216734 0.38363559]]
3496 fxs: [0.00276334 0.00277045 0.00279572 0.00288813 0.00299936 0.00307122
3497 0.00313216]
3498 Centroid: [0.32999573 0.64706148 0.38344948]
3499 x_new: [[0.32793299 0.65195561 0.38326336]]
3500 fx_new [0.00273859]
3501 Expanding
3502
3503 xs: [[0.32587025 0.65684975 0.38307724]
3504 [0.32586988 0.64970731 0.38252702]
3505 [0.32919203 0.64888693 0.38270118]
3506 [0.33023222 0.64711242 0.38236118]
3507 [0.3292191 0.64784818 0.38350374]
3508 [0.33217983 0.64644511 0.38421671]
3509 [0.3312186 0.64726304 0.3852009 ]]
3510 fxs: [0.00262653 0.00276334 0.00277045 0.00279572 0.00288813 0.00299936
3511 0.00307122]
3512 Centroid: [0.3291117 0.64915896 0.38336971]
3513 x_new: [[0.3270048 0.65105488 0.38153852]]
3514 fx_new [0.00260752]
3515 Expanding
3516
3517 xs: [[0.3248979 0.65295081 0.37970733]
3518 [0.32587025 0.65684975 0.38307724]
3519 [0.32586988 0.64970731 0.38252702]
3520 [0.32919203 0.64888693 0.38270118]
3521 [0.33023222 0.64711242 0.38236118]
3522 [0.3292191 0.64784818 0.38350374]
3523 [0.33217983 0.64644511 0.38421671]]
3524 fxs: [0.00240983 0.00262653 0.00276334 0.00277045 0.00279572 0.00288813
3525 0.00299936]
3526 Centroid: [0.32820874 0.6499715 0.38258492]
3527 x_new: [[0.32423766 0.65349789 0.38095312]]
3528 fx_new [0.00252379]
3529 Back to top
3530
3531 xs: [[0.3248979 0.65295081 0.37970733]
3532 [0.32423766 0.65349789 0.38095312]
3533 [0.32587025 0.65684975 0.38307724]
3534 [0.32586988 0.64970731 0.38252702]
3535 [0.32919203 0.64888693 0.38270118]
3536 [0.33023222 0.64711242 0.38236118]
3537 [0.3292191 0.64784818 0.38350374]]
3538 fxs: [0.00240983 0.00252379 0.00262653 0.00276334 0.00277045 0.00279572
3539 0.00288813]
3540 Centroid: [0.32707415 0.65097904 0.38211869]
3541 x_new: [[0.3249292 0.6541099 0.38073363]]
3542 fx_new [0.00247509]
3543 Back to top
3544
3545 xs: [[0.3248979 0.65295081 0.37970733]
3546 [0.3249292 0.6541099 0.38073363]
3547 [0.32423766 0.65349789 0.38095312]
3548 [0.32587025 0.65684975 0.38307724]
3549 [0.32586988 0.64970731 0.38252702]
3550 [0.32919203 0.64888693 0.38270118]
3551 [0.33023222 0.64711242 0.38236118]]
3552 fxs: [0.00240983 0.00247509 0.00252379 0.00262653 0.00276334 0.00277045

```

```

3553 0.00279572]
3554 Centroid: [0.32646131 0.65187357 0.38172296]
3555 x_new: [[0.32269039 0.65663472 0.38108473]]
3556 fx_new [0.00249411]
3557 Back to top
3558
3559 xs: [[0.3248979 0.65295081 0.37970733]
3560 [0.3249292 0.6541099 0.38073363]
3561 [0.32269039 0.65663472 0.38108473]
3562 [0.32423766 0.65349789 0.38095312]
3563 [0.32587025 0.65684975 0.38307724]
3564 [0.32586988 0.64970731 0.38252702]
3565 [0.32919203 0.64888693 0.38270118]]
3566 fxs: [0.00240983 0.00247509 0.00249411 0.00252379 0.00262653 0.00276334
3567 0.00277045]
3568 Centroid: [0.3253839 0.6532339 0.38154061]
3569 x_new: [[0.32157578 0.65758088 0.38038004]]
3570 fx_new [0.00243418]
3571 Back to top
3572
3573 xs: [[0.3248979 0.65295081 0.37970733]
3574 [0.32157578 0.65758088 0.38038004]
3575 [0.3249292 0.6541099 0.38073363]
3576 [0.32269039 0.65663472 0.38108473]
3577 [0.32423766 0.65349789 0.38095312]
3578 [0.32587025 0.65684975 0.38307724]
3579 [0.32586988 0.64970731 0.38252702]]
3580 fxs: [0.00240983 0.00243418 0.00247509 0.00249411 0.00252379 0.00262653
3581 0.00276334]
3582 Centroid: [0.32429586 0.65447589 0.38120902]
3583 x_new: [[0.32272185 0.65924447 0.37989101]]
3584 fx_new [0.00233531]
3585 Expanding
3586
3587 xs: [[0.32114783 0.66401305 0.378573 ]
3588 [0.3248979 0.65295081 0.37970733]
3589 [0.32157578 0.65758088 0.38038004]
3590 [0.3249292 0.6541099 0.38073363]
3591 [0.32269039 0.65663472 0.38108473]
3592 [0.32423766 0.65349789 0.38095312]
3593 [0.32587025 0.65684975 0.38307724]]
3594 fxs: [0.00220216 0.00240983 0.00243418 0.00247509 0.00249411 0.00252379
3595 0.00262653]
3596 Centroid: [0.32362129 0.65651957 0.38064416]
3597 x_new: [[0.32137232 0.65618939 0.37821107]]
3598 fx_new [0.00226685]
3599 Back to top
3600
3601 xs: [[0.32114783 0.66401305 0.378573 ]
3602 [0.32137232 0.65618939 0.37821107]
3603 [0.3248979 0.65295081 0.37970733]
3604 [0.32157578 0.65758088 0.38038004]
3605 [0.3249292 0.6541099 0.38073363]
3606 [0.32269039 0.65663472 0.38108473]
3607 [0.32423766 0.65349789 0.38095312]]
3608 fxs: [0.00220216 0.00226685 0.00240983 0.00243418 0.00247509 0.00249411
3609 0.00252379]
3610 Centroid: [0.32297873 0.65642523 0.37994899]
3611 x_new: [[0.32171979 0.65935258 0.37894486]]
3612 fx_new [0.00226878]
3613 Back to top
3614
3615 xs: [[0.32114783 0.66401305 0.378573 ]
3616 [0.32137232 0.65618939 0.37821107]
3617 [0.32171979 0.65935258 0.37894486]
3618 [0.3248979 0.65295081 0.37970733]
3619 [0.32157578 0.65758088 0.38038004]
3620 [0.3249292 0.6541099 0.38073363]
3621 [0.32269039 0.65663472 0.38108473]]
3622 fxs: [0.00220216 0.00226685 0.00226878 0.00240983 0.00243418 0.00247509

```

```

3623 0.00249411]
3624 Centroid: [0.32261903 0.65726162 0.37966209]
3625 x_new: [[0.32254767 0.65788851 0.37823946]]
3626 fx_new [0.00220995]
3627 Back to top
3628
3629 xs: [[0.32114783 0.66401305 0.378573 ]
3630 [0.32254767 0.65788851 0.37823946]
3631 [0.32137232 0.65618939 0.37821107]
3632 [0.32171979 0.65935258 0.37894486]
3633 [0.3248979 0.65295081 0.37970733]
3634 [0.32157578 0.65758088 0.38038004]
3635 [0.3249292 0.6541099 0.38073363]]
3636 fxs: [0.00220216 0.00220995 0.00226685 0.00226878 0.00240983 0.00243418
3637 0.00247509]
3638 Centroid: [0.32259864 0.65744073 0.37925563]
3639 x_new: [[0.32026809 0.66077156 0.37777762]]
3640 fx_new [0.00218075]
3641 Expanding
3642
3643 xs: [[0.31793753 0.6641024 0.37629962]
3644 [0.32114783 0.66401305 0.378573 ]
3645 [0.32254767 0.65788851 0.37823946]
3646 [0.32137232 0.65618939 0.37821107]
3647 [0.32171979 0.65935258 0.37894486]
3648 [0.3248979 0.65295081 0.37970733]
3649 [0.32157578 0.65758088 0.38038004]]
3650 fxs: [0.00208971 0.00220216 0.00220995 0.00226685 0.00226878 0.00240983
3651 0.00243418]
3652 Centroid: [0.32159983 0.65886823 0.3786222 ]
3653 x_new: [[0.32162389 0.66015559 0.37686436]]
3654 fx_new [0.00207446]
3655 Expanding
3656
3657 xs: [[0.32164795 0.66144294 0.37510652]
3658 [0.31793753 0.6641024 0.37629962]
3659 [0.32114783 0.66401305 0.378573 ]
3660 [0.32254767 0.65788851 0.37823946]
3661 [0.32137232 0.65618939 0.37821107]
3662 [0.32171979 0.65935258 0.37894486]
3663 [0.3248979 0.65295081 0.37970733]]
3664 fxs: [0.00190883 0.00208971 0.00220216 0.00220995 0.00226685 0.00226878
3665 0.00240983]
3666 Centroid: [0.32161014 0.65941996 0.37786884]
3667 x_new: [[0.31832238 0.6658891 0.37603034]]
3668 fx_new [0.00204897]
3669 Back to top
3670
3671 xs: [[0.32164795 0.66144294 0.37510652]
3672 [0.31832238 0.6658891 0.37603034]
3673 [0.31793753 0.6641024 0.37629962]
3674 [0.32114783 0.66401305 0.378573 ]
3675 [0.32254767 0.65788851 0.37823946]
3676 [0.32137232 0.65618939 0.37821107]
3677 [0.32171979 0.65935258 0.37894486]]
3678 fxs: [0.00190883 0.00204897 0.00208971 0.00220216 0.00220995 0.00226685
3679 0.00226878]
3680 Centroid: [0.32067078 0.66126828 0.37734355]
3681 x_new: [[0.31962177 0.66318399 0.37574225]]
3682 fx_new [0.00199865]
3683 Back to top
3684
3685 xs: [[0.32164795 0.66144294 0.37510652]
3686 [0.31962177 0.66318399 0.37574225]
3687 [0.31832238 0.6658891 0.37603034]
3688 [0.31793753 0.6641024 0.37629962]
3689 [0.32114783 0.66401305 0.378573 ]
3690 [0.32254767 0.65788851 0.37823946]
3691 [0.32137232 0.65618939 0.37821107]]
3692 fxs: [0.00190883 0.00199865 0.00204897 0.00208971 0.00220216 0.00220995

```

```

3693 0.00226685]
3694 Centroid: [0.32037107 0.66181563 0.37688604]
3695 x_new: [[0.31936981 0.66744186 0.375561 ]]
3696 fx_new [0.00197876]
3697 Back to top
3698
3699 xs: [[0.32164795 0.66144294 0.37510652]
3700 [0.31936981 0.66744186 0.375561 ]
3701 [0.31962177 0.66318399 0.37574225]
3702 [0.31832238 0.6658891 0.37603034]
3703 [0.31793753 0.6641024 0.37629962]
3704 [0.32114783 0.66401305 0.378573 ]
3705 [0.32254767 0.65788851 0.37823946]]
3706 fxs: [0.00190883 0.00197876 0.00199865 0.00204897 0.00208971 0.00220216
3707 0.00220995]
3708 Centroid: [0.32008499 0.66342312 0.37650745]
3709 x_new: [[0.31762231 0.66895773 0.37477545]]
3710 fx_new [0.00196953]
3711 Back to top
3712
3713 xs: [[0.32164795 0.66144294 0.37510652]
3714 [0.31762231 0.66895773 0.37477545]
3715 [0.31936981 0.66744186 0.375561 ]
3716 [0.31962177 0.66318399 0.37574225]
3717 [0.31832238 0.6658891 0.37603034]
3718 [0.31793753 0.6641024 0.37629962]
3719 [0.32114783 0.66401305 0.378573 ]]
3720 fxs: [0.00190883 0.00196953 0.00197876 0.00199865 0.00204897 0.00208971
3721 0.00220216]
3722 Centroid: [0.31938137 0.66500444 0.3760126 ]
3723 x_new: [[0.31761491 0.66599583 0.37345219]]
3724 fx_new [0.00185704]
3725 Expanding
3726
3727 xs: [[0.31584844 0.66698721 0.37089178]
3728 [0.32164795 0.66144294 0.37510652]
3729 [0.31762231 0.66895773 0.37477545]
3730 [0.31936981 0.66744186 0.375561 ]
3731 [0.31962177 0.66318399 0.37574225]
3732 [0.31832238 0.6658891 0.37603034]
3733 [0.31793753 0.6641024 0.37629962]]
3734 fxs: [0.00171646 0.00190883 0.00196953 0.00197876 0.00199865 0.00204897
3735 0.00208971]
3736 Centroid: [0.31862431 0.66542932 0.37491528]
3737 x_new: [[0.3193111 0.66675624 0.37353094]]
3738 fx_new [0.00181248]
3739 Back to top
3740
3741 xs: [[0.31584844 0.66698721 0.37089178]
3742 [0.3193111 0.66675624 0.37353094]
3743 [0.32164795 0.66144294 0.37510652]
3744 [0.31762231 0.66895773 0.37477545]
3745 [0.31936981 0.66744186 0.375561 ]
3746 [0.31962177 0.66318399 0.37574225]
3747 [0.31832238 0.6658891 0.37603034]]
3748 fxs: [0.00171646 0.00181248 0.00190883 0.00196953 0.00197876 0.00199865
3749 0.00204897]
3750 Centroid: [0.31882054 0.66580844 0.37451976]
3751 x_new: [[0.31931869 0.66572778 0.37300917]]
3752 fx_new [0.00177146]
3753 Back to top
3754
3755 xs: [[0.31584844 0.66698721 0.37089178]
3756 [0.31931869 0.66572778 0.37300917]
3757 [0.3193111 0.66675624 0.37353094]
3758 [0.32164795 0.66144294 0.37510652]
3759 [0.31762231 0.66895773 0.37477545]
3760 [0.31936981 0.66744186 0.375561 ]
3761 [0.31962177 0.66318399 0.37574225]]
3762 fxs: [0.00171646 0.00177146 0.00181248 0.00190883 0.00196953 0.00197876

```

```

3763 0.00199865]
3764 Centroid: [0.31896287 0.66578539 0.37408816]
3765 x_new: [[0.31830396 0.6683868 0.37243407]]
3766 fx_new [0.00175771]
3767 Back to top
3768
3769 xs: [[0.31584844 0.66698721 0.37089178]
3770 [0.31830396 0.6683868 0.37243407]
3771 [0.31931869 0.66572778 0.37300917]
3772 [0.3193111 0.66675624 0.37353094]
3773 [0.32164795 0.66144294 0.37510652]
3774 [0.31762231 0.66895773 0.37477545]
3775 [0.31936981 0.66744186 0.375561 ]]
3776 fxs: [0.00171646 0.00175771 0.00177146 0.00181248 0.00190883 0.00196953
3777 0.00197876]
3778 Centroid: [0.31877461 0.66652865 0.37361556]
3779 x_new: [[0.31817941 0.66561544 0.37167012]]
3780 fx_new [0.00170046]
3781 Expanding
3782
3783 xs: [[0.31758421 0.66470224 0.36972468]
3784 [0.31584844 0.66698721 0.37089178]
3785 [0.31830396 0.6683868 0.37243407]
3786 [0.31931869 0.66572778 0.37300917]
3787 [0.3193111 0.66675624 0.37353094]
3788 [0.32164795 0.66144294 0.37510652]
3789 [0.31762231 0.66895773 0.37477545]]
3790 fxs: [0.00157622 0.00171646 0.00175771 0.00177146 0.00181248 0.00190883
3791 0.00196953]
3792 Centroid: [0.31851952 0.66613728 0.3727818 ]
3793 x_new: [[0.31941674 0.66331682 0.37078815]]
3794 fx_new [0.00160776]
3795 Back to top
3796
3797 xs: [[0.31758421 0.66470224 0.36972468]
3798 [0.31941674 0.66331682 0.37078815]
3799 [0.31584844 0.66698721 0.37089178]
3800 [0.31830396 0.6683868 0.37243407]
3801 [0.31931869 0.66572778 0.37300917]
3802 [0.3193111 0.66675624 0.37353094]
3803 [0.32164795 0.66144294 0.37510652]]
3804 fxs: [0.00157622 0.00160776 0.00171646 0.00175771 0.00177146 0.00181248
3805 0.00190883]
3806 Centroid: [0.31877587 0.66533143 0.37221219]
3807 x_new: [[0.31590379 0.66921992 0.36931786]]
3808 fx_new [0.00160519]
3809 Back to top
3810
3811 xs: [[0.31758421 0.66470224 0.36972468]
3812 [0.31590379 0.66921992 0.36931786]
3813 [0.31941674 0.66331682 0.37078815]
3814 [0.31584844 0.66698721 0.37089178]
3815 [0.31830396 0.6683868 0.37243407]
3816 [0.31931869 0.66572778 0.37300917]
3817 [0.3193111 0.66675624 0.37353094]]
3818 fxs: [0.00157622 0.00160519 0.00160776 0.00171646 0.00175771 0.00177146
3819 0.00181248]
3820 Centroid: [0.31795528 0.66644243 0.37138524]
3821 x_new: [[0.31659945 0.66612862 0.36923953]]
3822 fx_new [0.00156957]
3823 Expanding
3824
3825 xs: [[0.31524363 0.66581481 0.36709383]
3826 [0.31758421 0.66470224 0.36972468]
3827 [0.31590379 0.66921992 0.36931786]
3828 [0.31941674 0.66331682 0.37078815]
3829 [0.31584844 0.66698721 0.37089178]
3830 [0.31830396 0.6683868 0.37243407]
3831 [0.31931869 0.66572778 0.37300917]]
3832 fxs: [0.00146773 0.00157622 0.00160519 0.00160776 0.00171646 0.00175771

```

```

3833 0.00177146]
3834 Centroid: [0.31737421 0.66630794 0.37046565]
3835 x_new: [[0.31542973 0.6668881 0.36792213]]
3836 fx_new [0.00151697]
3837 Back to top
3838
3839 xs: [[0.31524363 0.66581481 0.36709383]
3840 [0.31542973 0.6668881 0.36792213]
3841 [0.31758421 0.66470224 0.36972468]
3842 [0.31590379 0.66921992 0.36931786]
3843 [0.31941674 0.66331682 0.37078815]
3844 [0.31584844 0.66698721 0.37089178]
3845 [0.31830396 0.6683868 0.37243407]]
3846 fxs: [0.00146773 0.00151697 0.00157622 0.00160519 0.00160776 0.00171646
3847 0.00175771]
3848 Centroid: [0.31681864 0.6664737 0.36973893]
3849 x_new: [[0.31533332 0.6645606 0.36704379]]
3850 fx_new [0.00146483]
3851 Expanding
3852
3853 xs: [[0.313848 0.6626475 0.36434865]
3854 [0.31524363 0.66581481 0.36709383]
3855 [0.31542973 0.6668881 0.36792213]
3856 [0.31758421 0.66470224 0.36972468]
3857 [0.31590379 0.66921992 0.36931786]
3858 [0.31941674 0.66331682 0.37078815]
3859 [0.31584844 0.66698721 0.37089178]]
3860 fxs: [0.00135778 0.00146773 0.00151697 0.00157622 0.00160519 0.00160776
3861 0.00171646]
3862 Centroid: [0.31618208 0.6656538 0.36858387]
3863 x_new: [[0.31651571 0.66432039 0.36627595]]
3864 fx_new [0.00137355]
3865 Back to top
3866
3867 xs: [[0.313848 0.6626475 0.36434865]
3868 [0.31651571 0.66432039 0.36627595]
3869 [0.31524363 0.66581481 0.36709383]
3870 [0.31542973 0.6668881 0.36792213]
3871 [0.31758421 0.66470224 0.36972468]
3872 [0.31590379 0.66921992 0.36931786]
3873 [0.31941674 0.66331682 0.37078815]]
3874 fxs: [0.00135778 0.00137355 0.00146773 0.00151697 0.00157622 0.00160519
3875 0.00160776]
3876 Centroid: [0.3162774 0.66527283 0.36792446]
3877 x_new: [[0.31313807 0.66722883 0.36506078]]
3878 fx_new [0.0014148]
3879 Back to top
3880
3881 xs: [[0.313848 0.6626475 0.36434865]
3882 [0.31651571 0.66432039 0.36627595]
3883 [0.31313807 0.66722883 0.36506078]
3884 [0.31524363 0.66581481 0.36709383]
3885 [0.31542973 0.6668881 0.36792213]
3886 [0.31758421 0.66470224 0.36972468]
3887 [0.31590379 0.66921992 0.36931786]]
3888 fxs: [0.00135778 0.00137355 0.0014148 0.00146773 0.00151697 0.00157622
3889 0.00160519]
3890 Centroid: [0.31538045 0.66583169 0.36710627]
3891 x_new: [[0.31485711 0.66244345 0.36489468]]
3892 fx_new [0.00135532]
3893 Expanding
3894
3895 xs: [[0.31433376 0.65905521 0.36268308]
3896 [0.313848 0.6626475 0.36434865]
3897 [0.31651571 0.66432039 0.36627595]
3898 [0.31313807 0.66722883 0.36506078]
3899 [0.31524363 0.66581481 0.36709383]
3900 [0.31542973 0.6668881 0.36792213]
3901 [0.31758421 0.66470224 0.36972468]]
3902 fxs: [0.00128033 0.00135778 0.00137355 0.0014148 0.00146773 0.00151697

```



```

3903 0.00157622]
3904 Centroid: [0.31515616 0.66437958 0.36615844]
3905 x_new: [[0.31272811 0.66405693 0.3625922 ]]
3906 fx_new [0.00128747]
3907 Back to top
3908
3909 xs: [[0.31433376 0.65905521 0.36268308]
3910 [0.31272811 0.66405693 0.3625922 ]
3911 [0.313848 0.6626475 0.36434865]
3912 [0.31651571 0.66432039 0.36627595]
3913 [0.31313807 0.66722883 0.36506078]
3914 [0.31524363 0.66581481 0.36709383]
3915 [0.31542973 0.6668881 0.36792213]]
3916 fxs: [0.00128033 0.00128747 0.00135778 0.00137355 0.0014148 0.00146773
3917 0.00151697]
3918 Centroid: [0.31446243 0.6642874 0.36513952]
3919 x_new: [[0.31349514 0.66168669 0.3623569 ]]
3920 fx_new [0.00126072]
3921 Expanding
3922
3923 xs: [[0.31252784 0.65908598 0.35957429]
3924 [0.31433376 0.65905521 0.36268308]
3925 [0.31272811 0.66405693 0.3625922 ]
3926 [0.313848 0.6626475 0.36434865]
3927 [0.31651571 0.66432039 0.36627595]
3928 [0.31313807 0.66722883 0.36506078]
3929 [0.31524363 0.66581481 0.36709383]]
3930 fxs: [0.00117892 0.00128033 0.00128747 0.00135778 0.00137355 0.0014148
3931 0.00146773]
3932 Centroid: [0.31404788 0.66317281 0.36394697]
3933 x_new: [[0.31285212 0.66053081 0.36080011]]
3934 fx_new [0.00121155]
3935 Back to top
3936
3937 xs: [[0.31252784 0.65908598 0.35957429]
3938 [0.31285212 0.66053081 0.36080011]
3939 [0.31433376 0.65905521 0.36268308]
3940 [0.31272811 0.66405693 0.3625922 ]
3941 [0.313848 0.6626475 0.36434865]
3942 [0.31651571 0.66432039 0.36627595]
3943 [0.31313807 0.66722883 0.36506078]]
3944 fxs: [0.00117892 0.00121155 0.00128033 0.00128747 0.00135778 0.00137355
3945 0.0014148 ]
3946 Centroid: [0.31370623 0.66241795 0.36304787]
3947 x_new: [[0.31427439 0.65760707 0.36103496]]
3948 fx_new [0.0012127]
3949 Back to top
3950
3951 xs: [[0.31252784 0.65908598 0.35957429]
3952 [0.31285212 0.66053081 0.36080011]
3953 [0.31427439 0.65760707 0.36103496]
3954 [0.31433376 0.65905521 0.36268308]
3955 [0.31272811 0.66405693 0.3625922 ]
3956 [0.313848 0.6626475 0.36434865]
3957 [0.31651571 0.66432039 0.36627595]]
3958 fxs: [0.00117892 0.00121155 0.0012127 0.00128033 0.00128747 0.00135778
3959 0.00137355]
3960 Centroid: [0.31386856 0.66104341 0.36247275]
3961 x_new: [[0.31122141 0.65776644 0.35866954]]
3962 fx_new [0.00121007]
3963 Back to top
3964
3965 xs: [[0.31252784 0.65908598 0.35957429]
3966 [0.31122141 0.65776644 0.35866954]
3967 [0.31285212 0.66053081 0.36080011]
3968 [0.31427439 0.65760707 0.36103496]
3969 [0.31433376 0.65905521 0.36268308]
3970 [0.31272811 0.66405693 0.3625922 ]
3971 [0.313848 0.6626475 0.36434865]]
3972 fxs: [0.00117892 0.00121007 0.00121155 0.0012127 0.00128033 0.00128747

```

```

3973 0.00135778]
3974 Centroid: [0.31311223 0.66010713 0.36138612]
3975 x_new: [[0.31237646 0.65756676 0.35842359]]
3976 fx_new [0.00115152]
3977 Expanding
3978
3979 xs: [[0.3116407 0.65502639 0.35546107]
3980 [0.31252784 0.65908598 0.35957429]
3981 [0.31122141 0.65776644 0.35866954]
3982 [0.31285212 0.66053081 0.36080011]
3983 [0.31427439 0.65760707 0.36103496]
3984 [0.31433376 0.65905521 0.36268308]
3985 [0.31272811 0.66405693 0.3625922 ]]
3986 fxs: [0.0010957 0.00117892 0.00121007 0.00121155 0.0012127 0.00128033
3987 0.00128747]
3988 Centroid: [0.3127969 0.6590184 0.36011646]
3989 x_new: [[0.3128657 0.65397988 0.35764073]]
3990 fx_new [0.00117073]
3991 Back to top
3992
3993 xs: [[0.3116407 0.65502639 0.35546107]
3994 [0.3128657 0.65397988 0.35764073]
3995 [0.31252784 0.65908598 0.35957429]
3996 [0.31122141 0.65776644 0.35866954]
3997 [0.31285212 0.66053081 0.36080011]
3998 [0.31427439 0.65760707 0.36103496]
3999 [0.31433376 0.65905521 0.36268308]]
4000 fxs: [0.0010957 0.00117073 0.00117892 0.00121007 0.00121155 0.0012127
4001 0.00128033]
4002 Centroid: [0.31281656 0.65757883 0.35940911]
4003 x_new: [[0.31129936 0.65610244 0.35613514]]
4004 fx_new [0.00111702]
4005 Back to top
4006
4007 xs: [[0.3116407 0.65502639 0.35546107]
4008 [0.31129936 0.65610244 0.35613514]
4009 [0.3128657 0.65397988 0.35764073]
4010 [0.31252784 0.65908598 0.35957429]
4011 [0.31122141 0.65776644 0.35866954]
4012 [0.31285212 0.66053081 0.36080011]
4013 [0.31427439 0.65760707 0.36103496]]
4014 fxs: [0.0010957 0.00111702 0.00117073 0.00117892 0.00121007 0.00121155
4015 0.0012127 ]
4016 Centroid: [0.31238307 0.657157 0.35847369]
4017 x_new: [[0.31049175 0.65670693 0.35591242]]
4018 fx_new [0.00113075]
4019 Back to top
4020
4021 xs: [[0.3116407 0.65502639 0.35546107]
4022 [0.31129936 0.65610244 0.35613514]
4023 [0.31049175 0.65670693 0.35591242]
4024 [0.3128657 0.65397988 0.35764073]
4025 [0.31252784 0.65908598 0.35957429]
4026 [0.31122141 0.65776644 0.35866954]
4027 [0.31285212 0.66053081 0.36080011]]
4028 fxs: [0.0010957 0.00111702 0.00113075 0.00117073 0.00117892 0.00121007
4029 0.00121155]
4030 Centroid: [0.3118427 0.65702841 0.3577419 ]
4031 x_new: [[0.31083327 0.65352601 0.35468369]]
4032 fx_new [0.00113477]
4033 Back to top
4034
4035 xs: [[0.3116407 0.65502639 0.35546107]
4036 [0.31129936 0.65610244 0.35613514]
4037 [0.31049175 0.65670693 0.35591242]
4038 [0.31083327 0.65352601 0.35468369]
4039 [0.3128657 0.65397988 0.35764073]
4040 [0.31252784 0.65908598 0.35957429]
4041 [0.31122141 0.65776644 0.35866954]]
4042 fxs: [0.0010957 0.00111702 0.00113075 0.00113477 0.00117073 0.00117892

```

```

4043 0.00121007]
4044 Centroid: [0.31155429 0.65602773 0.35686812]
4045 x_new: [[0.31188717 0.65428902 0.35506671]]
4046 fx_new [0.00108548]
4047 Expanding
4048
4049 xs: [[0.31222005 0.6525503 0.35326529]
4050 [0.3116407 0.65502639 0.35546107]
4051 [0.31129936 0.65610244 0.35613514]
4052 [0.31049175 0.65670693 0.35591242]
4053 [0.31083327 0.65352601 0.35468369]
4054 [0.3128657 0.65397988 0.35764073]
4055 [0.31252784 0.65908598 0.35957429]]
4056 fxs: [0.00104233 0.0010957 0.00111702 0.00113075 0.00113477 0.00117073
4057 0.00117892]
4058 Centroid: [0.31169695 0.65528256 0.35609609]
4059 x_new: [[0.31086607 0.65147915 0.35261789]]
4060 fx_new [0.00110733]
4061 Back to top
4062
4063 xs: [[0.31222005 0.6525503 0.35326529]
4064 [0.3116407 0.65502639 0.35546107]
4065 [0.31086607 0.65147915 0.35261789]
4066 [0.31129936 0.65610244 0.35613514]
4067 [0.31049175 0.65670693 0.35591242]
4068 [0.31083327 0.65352601 0.35468369]
4069 [0.3128657 0.65397988 0.35764073]]
4070 fxs: [0.00104233 0.0010957 0.00110733 0.00111702 0.00113075 0.00113477
4071 0.00117073]
4072 Centroid: [0.31145956 0.65419587 0.35510232]
4073 x_new: [[0.31005341 0.65441187 0.35256391]]
4074 fx_new [0.00106195]
4075 Back to top
4076
4077 xs: [[0.31222005 0.6525503 0.35326529]
4078 [0.31005341 0.65441187 0.35256391]
4079 [0.3116407 0.65502639 0.35546107]
4080 [0.31086607 0.65147915 0.35261789]
4081 [0.31129936 0.65610244 0.35613514]
4082 [0.31049175 0.65670693 0.35591242]
4083 [0.31083327 0.65352601 0.35468369]]
4084 fxs: [0.00104233 0.00106195 0.0010957 0.00110733 0.00111702 0.00113075
4085 0.00113477]
4086 Centroid: [0.3110578 0.65425759 0.35437706]
4087 x_new: [[0.31128233 0.65498916 0.35407043]]
4088 fx_new [0.00105264]
4089 Back to top
4090
4091 xs: [[0.31222005 0.6525503 0.35326529]
4092 [0.31128233 0.65498916 0.35407043]
4093 [0.31005341 0.65441187 0.35256391]
4094 [0.3116407 0.65502639 0.35546107]
4095 [0.31086607 0.65147915 0.35261789]
4096 [0.31129936 0.65610244 0.35613514]
4097 [0.31049175 0.65670693 0.35591242]]
4098 fxs: [0.00104233 0.00105264 0.00106195 0.0010957 0.00110733 0.00111702
4099 0.00113075]
4100 Centroid: [0.31112195 0.65446661 0.35428945]
4101 x_new: [[0.31175215 0.65222628 0.35266647]]
4102 fx_new [0.00104804]
4103 Back to top
4104
4105 xs: [[0.31222005 0.6525503 0.35326529]
4106 [0.31175215 0.65222628 0.35266647]
4107 [0.31128233 0.65498916 0.35407043]
4108 [0.31005341 0.65441187 0.35256391]
4109 [0.3116407 0.65502639 0.35546107]
4110 [0.31086607 0.65147915 0.35261789]
4111 [0.31129936 0.65610244 0.35613514]]
4112 fxs: [0.00104233 0.00104804 0.00105264 0.00106195 0.0010957 0.00110733

```

```

4113 0.00111702]
4114 Centroid: [0.31130201 0.65382651 0.35382574]
4115 x_new: [[0.31130466 0.65155058 0.35151634]]
4116 fx_new [0.00104438]
4117 Back to top
4118
4119 xs: [[0.31222005 0.6525503 0.35326529]
4120 [0.31130466 0.65155058 0.35151634]
4121 [0.31175215 0.65222628 0.35266647]
4122 [0.31128233 0.65498916 0.35407043]
4123 [0.31005341 0.65441187 0.35256391]
4124 [0.3116407 0.65502639 0.35546107]
4125 [0.31086607 0.65147915 0.35261789]]
4126 fxs: [0.00104233 0.00104438 0.00104804 0.00105264 0.00106195 0.0010957
4127 0.00110733]
4128 Centroid: [0.31130276 0.65317625 0.35316591]
4129 x_new: [[0.31173946 0.65487335 0.35371394]]
4130 fx_new [0.00102075]
4131 Expanding
4132
4133 xs: [[0.31217616 0.65657045 0.35426196]
4134 [0.31222005 0.6525503 0.35326529]
4135 [0.31130466 0.65155058 0.35151634]
4136 [0.31175215 0.65222628 0.35266647]
4137 [0.31128233 0.65498916 0.35407043]
4138 [0.31005341 0.65441187 0.35256391]
4139 [0.3116407 0.65502639 0.35546107]]
4140 fxs: [0.00098757 0.00104233 0.00104438 0.00104804 0.00105264 0.00106195
4141 0.0010957 ]
4142 Centroid: [0.31148992 0.65390358 0.35340078]
4143 x_new: [[0.31133915 0.65278076 0.35134049]]
4144 fx_new [0.00100082]
4145 Back to top
4146
4147 xs: [[0.31217616 0.65657045 0.35426196]
4148 [0.31133915 0.65278076 0.35134049]
4149 [0.31222005 0.6525503 0.35326529]
4150 [0.31130466 0.65155058 0.35151634]
4151 [0.31175215 0.65222628 0.35266647]
4152 [0.31128233 0.65498916 0.35407043]
4153 [0.31005341 0.65441187 0.35256391]]
4154 fxs: [0.00098757 0.00100082 0.00104233 0.00104438 0.00104804 0.00105264
4155 0.00106195]
4156 Centroid: [0.31144684 0.65358277 0.35281213]
4157 x_new: [[0.31284027 0.65275368 0.35306035]]
4158 fx_new [0.00100269]
4159 Back to top
4160
4161 xs: [[0.31217616 0.65657045 0.35426196]
4162 [0.31133915 0.65278076 0.35134049]
4163 [0.31284027 0.65275368 0.35306035]
4164 [0.31222005 0.6525503 0.35326529]
4165 [0.31130466 0.65155058 0.35151634]
4166 [0.31175215 0.65222628 0.35266647]
4167 [0.31128233 0.65498916 0.35407043]]
4168 fxs: [0.00098757 0.00100082 0.00100269 0.00104233 0.00104438 0.00104804
4169 0.00105264]
4170 Centroid: [0.31184497 0.65334589 0.35288305]
4171 x_new: [[0.3124076 0.65170262 0.35169567]]
4172 fx_new [0.00099898]
4173 Back to top
4174
4175 xs: [[0.31217616 0.65657045 0.35426196]
4176 [0.3124076 0.65170262 0.35169567]
4177 [0.31133915 0.65278076 0.35134049]
4178 [0.31284027 0.65275368 0.35306035]
4179 [0.31222005 0.6525503 0.35326529]
4180 [0.31130466 0.65155058 0.35151634]
4181 [0.31175215 0.65222628 0.35266647]]
4182 fxs: [0.00098757 0.00099898 0.00100082 0.00100269 0.00104233 0.00104438

```

```

4183 0.00104804]
4184 Centroid: [0.31200572 0.65287638 0.3525438 ]
4185 x_new: [[0.31225929 0.65352649 0.35242112]]
4186 fx_new [0.00098112]
4187 Expanding
4188
4189 xs: [[0.31251286 0.65417659 0.35229845]
4190 [0.31217616 0.65657045 0.35426196]
4191 [0.3124076 0.65170262 0.35169567]
4192 [0.31133915 0.65278076 0.35134049]
4193 [0.31284027 0.65275368 0.35306035]
4194 [0.31222005 0.6525503 0.35326529]
4195 [0.31130466 0.65155058 0.35151634]]
4196 fxs: [0.00094917 0.00098757 0.00099898 0.00100082 0.00100269 0.00104233
4197 0.00104438]
4198 Centroid: [0.31211439 0.653155 0.35249122]
4199 x_new: [[0.31292413 0.65475941 0.3534661 ]]
4200 fx_new [0.00096365]
4201 Back to top
4202
4203 xs: [[0.31251286 0.65417659 0.35229845]
4204 [0.31292413 0.65475941 0.3534661 ]
4205 [0.31217616 0.65657045 0.35426196]
4206 [0.3124076 0.65170262 0.35169567]
4207 [0.31133915 0.65278076 0.35134049]
4208 [0.31284027 0.65275368 0.35306035]
4209 [0.31222005 0.6525503 0.35326529]]
4210 fxs: [0.00094917 0.00096365 0.00098757 0.00099898 0.00100082 0.00100269
4211 0.00104233]
4212 Centroid: [0.31234575 0.6536134 0.35276976]
4213 x_new: [[0.31247145 0.6546765 0.35227423]]
4214 fx_new [0.00093774]
4215 Expanding
4216
4217 xs: [[0.31259715 0.6557396 0.3517787 ]
4218 [0.31251286 0.65417659 0.35229845]
4219 [0.31292413 0.65475941 0.3534661 ]
4220 [0.31217616 0.65657045 0.35426196]
4221 [0.3124076 0.65170262 0.35169567]
4222 [0.31133915 0.65278076 0.35134049]
4223 [0.31284027 0.65275368 0.35306035]]
4224 fxs: [0.00088962 0.00094917 0.00096365 0.00098757 0.00099898 0.00100082
4225 0.00100269]
4226 Centroid: [0.31239962 0.65406902 0.35255739]
4227 x_new: [[0.31195896 0.65538435 0.35205443]]
4228 fx_new [0.00093463]
4229 Back to top
4230
4231 xs: [[0.31259715 0.6557396 0.3517787 ]
4232 [0.31195896 0.65538435 0.35205443]
4233 [0.31251286 0.65417659 0.35229845]
4234 [0.31292413 0.65475941 0.3534661 ]
4235 [0.31217616 0.65657045 0.35426196]
4236 [0.3124076 0.65170262 0.35169567]
4237 [0.31133915 0.65278076 0.35134049]]
4238 fxs: [0.00088962 0.00093463 0.00094917 0.00096365 0.00098757 0.00099898
4239 0.00100082]
4240 Centroid: [0.31227372 0.65444483 0.35241369]
4241 x_new: [[0.31320829 0.65610889 0.35348688]]
4242 fx_new [0.00092265]
4243 Back to top
4244
4245 xs: [[0.31259715 0.6557396 0.3517787 ]
4246 [0.31320829 0.65610889 0.35348688]
4247 [0.31195896 0.65538435 0.35205443]
4248 [0.31251286 0.65417659 0.35229845]
4249 [0.31292413 0.65475941 0.3534661 ]
4250 [0.31217616 0.65657045 0.35426196]
4251 [0.3124076 0.65170262 0.35169567]]
4252 fxs: [0.00088962 0.00092265 0.00093463 0.00094917 0.00096365 0.00098757

```

```

4253 0.00099898]
4254 Centroid: [0.31254074 0.65492027 0.35272031]
4255 x_new: [[0.31267387 0.65813793 0.35374495]]
4256 fx_new [0.00091619]
4257 Back to top
4258
4259 xs: [[0.31259715 0.6557396 0.3517787 ]
4260 [0.31267387 0.65813793 0.35374495]
4261 [0.31320829 0.65610889 0.35348688]
4262 [0.31195896 0.65538435 0.35205443]
4263 [0.31251286 0.65417659 0.35229845]
4264 [0.31292413 0.65475941 0.3534661 ]
4265 [0.31217616 0.65657045 0.35426196]]
4266 fxs: [0.00088962 0.00091619 0.00092265 0.00093463 0.00094917 0.00096365
4267 0.00098757]
4268 Centroid: [0.31257877 0.6558396 0.35301307]
4269 x_new: [[0.31298139 0.65510875 0.35176417]]
4270 fx_new [0.00088748]
4271 Expanding
4272
4273 xs: [[0.313384 0.6543779 0.35051528]
4274 [0.31259715 0.6557396 0.3517787 ]
4275 [0.31267387 0.65813793 0.35374495]
4276 [0.31320829 0.65610889 0.35348688]
4277 [0.31195896 0.65538435 0.35205443]
4278 [0.31251286 0.65417659 0.35229845]
4279 [0.31292413 0.65475941 0.3534661 ]]
4280 fxs: [0.00084421 0.00088962 0.00091619 0.00092265 0.00093463 0.00094917
4281 0.00096365]
4282 Centroid: [0.31275132 0.65552638 0.35247783]
4283 x_new: [[0.31257851 0.65629335 0.35148955]]
4284 fx_new [0.00086802]
4285 Back to top
4286
4287 xs: [[0.313384 0.6543779 0.35051528]
4288 [0.31257851 0.65629335 0.35148955]
4289 [0.31259715 0.6557396 0.3517787 ]
4290 [0.31267387 0.65813793 0.35374495]
4291 [0.31320829 0.65610889 0.35348688]
4292 [0.31195896 0.65538435 0.35205443]
4293 [0.31251286 0.65417659 0.35229845]]
4294 fxs: [0.00084421 0.00086802 0.00088962 0.00091619 0.00092265 0.00093463
4295 0.00094917]
4296 Centroid: [0.31270195 0.65574552 0.35219546]
4297 x_new: [[0.31289103 0.65731444 0.35209248]]
4298 fx_new [0.00085726]
4299 Back to top
4300
4301 xs: [[0.313384 0.6543779 0.35051528]
4302 [0.31289103 0.65731444 0.35209248]
4303 [0.31257851 0.65629335 0.35148955]
4304 [0.31259715 0.6557396 0.3517787 ]
4305 [0.31267387 0.65813793 0.35374495]
4306 [0.31320829 0.65610889 0.35348688]
4307 [0.31195896 0.65538435 0.35205443]]
4308 fxs: [0.00084421 0.00085726 0.00086802 0.00088962 0.00091619 0.00092265
4309 0.00093463]
4310 Centroid: [0.31275597 0.65619378 0.35216604]
4311 x_new: [[0.31355298 0.65700321 0.35227765]]
4312 fx_new [0.00084353]
4313 Expanding
4314
4315 xs: [[0.31434999 0.65781264 0.35238926]
4316 [0.313384 0.6543779 0.35051528]
4317 [0.31289103 0.65731444 0.35209248]
4318 [0.31257851 0.65629335 0.35148955]
4319 [0.31259715 0.6557396 0.3517787 ]
4320 [0.31267387 0.65813793 0.35374495]
4321 [0.31320829 0.65610889 0.35348688]]
4322 fxs: [0.00080189 0.00084421 0.00085726 0.00086802 0.00088962 0.00091619

```

```

4323 0.00092265]
4324 Centroid: [0.31309755 0.65654068 0.35221387]
4325 x_new: [[0.31298681 0.65697247 0.35094087]]
4326 fx_new [0.00081798]
4327 Back to top
4328
4329 xs: [[0.31434999 0.65781264 0.35238926]
4330 [0.31298681 0.65697247 0.35094087]
4331 [0.313384 0.6543779 0.35051528]
4332 [0.31289103 0.65731444 0.35209248]
4333 [0.31257851 0.65629335 0.35148955]
4334 [0.31259715 0.6557396 0.3517787 ]
4335 [0.31267387 0.65813793 0.35374495]]
4336 fxs: [0.00080189 0.00081798 0.00084421 0.00085726 0.00086802 0.00088962
4337 0.00091619]
4338 Centroid: [0.31306591 0.65666405 0.35185016]
4339 x_new: [[0.31345795 0.65519017 0.34995536]]
4340 fx_new [0.00080303]
4341 Back to top
4342
4343 xs: [[0.31434999 0.65781264 0.35238926]
4344 [0.31345795 0.65519017 0.34995536]
4345 [0.31298681 0.65697247 0.35094087]
4346 [0.313384 0.6543779 0.35051528]
4347 [0.31289103 0.65731444 0.35209248]
4348 [0.31257851 0.65629335 0.35148955]
4349 [0.31259715 0.6557396 0.3517787 ]]
4350 fxs: [0.00080189 0.00080303 0.00081798 0.00084421 0.00085726 0.00086802
4351 0.00088962]
4352 Centroid: [0.31317792 0.65624294 0.35130878]
4353 x_new: [[0.3137587 0.65674628 0.35083887]]
4354 fx_new [0.00078802]
4355 Expanding
4356
4357 xs: [[0.31433947 0.65724962 0.35036895]
4358 [0.31434999 0.65781264 0.35238926]
4359 [0.31345795 0.65519017 0.34995536]
4360 [0.31298681 0.65697247 0.35094087]
4361 [0.313384 0.6543779 0.35051528]
4362 [0.31289103 0.65731444 0.35209248]
4363 [0.31257851 0.65629335 0.35148955]]
4364 fxs: [0.00073966 0.00080189 0.00080303 0.00081798 0.00084421 0.00085726
4365 0.00086802]
4366 Centroid: [0.31342682 0.65645866 0.35110739]
4367 x_new: [[0.31427513 0.65662396 0.35072523]]
4368 fx_new [0.00076655]
4369 Back to top
4370
4371 xs: [[0.31433947 0.65724962 0.35036895]
4372 [0.31427513 0.65662396 0.35072523]
4373 [0.31434999 0.65781264 0.35238926]
4374 [0.31345795 0.65519017 0.34995536]
4375 [0.31298681 0.65697247 0.35094087]
4376 [0.313384 0.6543779 0.35051528]
4377 [0.31289103 0.65731444 0.35209248]]
4378 fxs: [0.00073966 0.00076655 0.00080189 0.00080303 0.00081798 0.00084421
4379 0.00085726]
4380 Centroid: [0.3136692 0.65650589 0.3509982 ]
4381 x_new: [[0.31444736 0.65569733 0.34990393]]
4382 fx_new [0.00075159]
4383 Back to top
4384
4385 xs: [[0.31433947 0.65724962 0.35036895]
4386 [0.31444736 0.65569733 0.34990393]
4387 [0.31427513 0.65662396 0.35072523]
4388 [0.31434999 0.65781264 0.35238926]
4389 [0.31345795 0.65519017 0.34995536]
4390 [0.31298681 0.65697247 0.35094087]
4391 [0.313384 0.6543779 0.35051528]]
4392 fxs: [0.00073966 0.00075159 0.00076655 0.00080189 0.00080303 0.00081798

```

```

4393 0.00084421]
4394 Centroid: [0.31389153 0.65627487 0.35068555]
4395 x_new: [[0.31439907 0.65817183 0.35085583]]
4396 fx_new [0.00073771]
4397 Expanding
4398
4399 xs: [[0.3149066 0.6600688 0.3510261 ]
4400 [0.31433947 0.65724962 0.35036895]
4401 [0.31444736 0.65569733 0.34990393]
4402 [0.31427513 0.65662396 0.35072523]
4403 [0.31434999 0.65781264 0.35238926]
4404 [0.31345795 0.65519017 0.34995536]
4405 [0.31298681 0.65697247 0.35094087]]
4406 fxs: [0.00069611 0.00073966 0.00075159 0.00076655 0.00080189 0.00080303
4407 0.00081798]
4408 Centroid: [0.31410905 0.65708785 0.35075853]
4409 x_new: [[0.31523128 0.65720324 0.35057619]]
4410 fx_new [0.00071456]
4411 Back to top
4412
4413 xs: [[0.3149066 0.6600688 0.3510261 ]
4414 [0.31523128 0.65720324 0.35057619]
4415 [0.31433947 0.65724962 0.35036895]
4416 [0.31444736 0.65569733 0.34990393]
4417 [0.31427513 0.65662396 0.35072523]
4418 [0.31434999 0.65781264 0.35238926]
4419 [0.31345795 0.65519017 0.34995536]]
4420 fxs: [0.00069611 0.00071456 0.00073966 0.00075159 0.00076655 0.00080189
4421 0.00080303]
4422 Centroid: [0.31442968 0.65712082 0.35070643]
4423 x_new: [[0.31540142 0.65905148 0.3514575 ]]
4424 fx_new [0.00070803]
4425 Back to top
4426
4427 xs: [[0.3149066 0.6600688 0.3510261 ]
4428 [0.31540142 0.65905148 0.3514575 ]
4429 [0.31523128 0.65720324 0.35057619]
4430 [0.31433947 0.65724962 0.35036895]
4431 [0.31444736 0.65569733 0.34990393]
4432 [0.31427513 0.65662396 0.35072523]
4433 [0.31434999 0.65781264 0.35238926]]
4434 fxs: [0.00069611 0.00070803 0.00071456 0.00073966 0.00075159 0.00076655
4435 0.00080189]
4436 Centroid: [0.31470732 0.65767244 0.35092102]
4437 x_new: [[0.31506465 0.65753224 0.34945279]]
4438 fx_new [0.00067702]
4439 Expanding
4440
4441 xs: [[0.31542198 0.65739204 0.34798455]
4442 [0.3149066 0.6600688 0.3510261 ]
4443 [0.31540142 0.65905148 0.3514575 ]
4444 [0.31523128 0.65720324 0.35057619]
4445 [0.31433947 0.65724962 0.35036895]
4446 [0.31444736 0.65569733 0.34990393]
4447 [0.31427513 0.65662396 0.35072523]]
4448 fxs: [0.00062149 0.00069611 0.00070803 0.00071456 0.00073966 0.00075159
4449 0.00076655]
4450 Centroid: [0.31486046 0.65761235 0.35029178]
4451 x_new: [[0.31544579 0.65860074 0.34985833]]
4452 fx_new [0.0006581]
4453 Back to top
4454
4455 xs: [[0.31542198 0.65739204 0.34798455]
4456 [0.31544579 0.65860074 0.34985833]
4457 [0.3149066 0.6600688 0.3510261 ]
4458 [0.31540142 0.65905148 0.3514575 ]
4459 [0.31523128 0.65720324 0.35057619]
4460 [0.31433947 0.65724962 0.35036895]
4461 [0.31444736 0.65569733 0.34990393]]
4462 fxs: [0.00062149 0.0006581 0.00069611 0.00070803 0.00071456 0.00073966

```



```

4463 0.00075159]
4464 Centroid: [0.3150277 0.65789475 0.35016794]
4465 x_new: [[0.31560804 0.66009217 0.35043195]]
4466 fx_new [0.00064977]
4467 Back to top
4468
4469 xs: [[0.31542198 0.65739204 0.34798455]
4470 [0.31560804 0.66009217 0.35043195]
4471 [0.31544579 0.65860074 0.34985833]
4472 [0.3149066 0.6600688 0.3510261 ]
4473 [0.31540142 0.65905148 0.3514575 ]
4474 [0.31523128 0.65720324 0.35057619]
4475 [0.31433947 0.65724962 0.35036895]]
4476 fxs: [0.00062149 0.00064977 0.0006581 0.00069611 0.00070803 0.00071456
4477 0.00073966]
4478 Centroid: [0.31519351 0.65852258 0.35024337]
4479 x_new: [[0.31604755 0.65979555 0.35011778]]
4480 fx_new [0.00062773]
4481 Back to top
4482
4483 xs: [[0.31542198 0.65739204 0.34798455]
4484 [0.31604755 0.65979555 0.35011778]
4485 [0.31560804 0.66009217 0.35043195]
4486 [0.31544579 0.65860074 0.34985833]
4487 [0.3149066 0.6600688 0.3510261 ]
4488 [0.31540142 0.65905148 0.3514575 ]
4489 [0.31523128 0.65720324 0.35057619]]
4490 fxs: [0.00062149 0.00062773 0.00064977 0.0006581 0.00069611 0.00070803
4491 0.00071456]
4492 Centroid: [0.31543752 0.65888629 0.35020749]
4493 x_new: [[0.31564377 0.66056933 0.34983878]]
4494 fx_new [0.00062253]
4495 Back to top
4496
4497 xs: [[0.31542198 0.65739204 0.34798455]
4498 [0.31564377 0.66056933 0.34983878]
4499 [0.31604755 0.65979555 0.35011778]
4500 [0.31560804 0.66009217 0.35043195]
4501 [0.31544579 0.65860074 0.34985833]
4502 [0.3149066 0.6600688 0.3510261 ]
4503 [0.31540142 0.65905148 0.3514575 ]]
4504 fxs: [0.00062149 0.00062253 0.00062773 0.00064977 0.0006581 0.00069611
4505 0.00070803]
4506 Centroid: [0.31549645 0.65936716 0.35010214]
4507 x_new: [[0.31559148 0.65968284 0.34874678]]
4508 fx_new [0.00060112]
4509 Expanding
4510
4511 xs: [[0.31568651 0.65999852 0.34739142]
4512 [0.31542198 0.65739204 0.34798455]
4513 [0.31564377 0.66056933 0.34983878]
4514 [0.31604755 0.65979555 0.35011778]
4515 [0.31560804 0.66009217 0.35043195]
4516 [0.31544579 0.65860074 0.34985833]
4517 [0.3149066 0.6600688 0.3510261 ]]
4518 fxs: [0.0005535 0.00062149 0.00062253 0.00062773 0.00064977 0.0006581
4519 0.00069611]
4520 Centroid: [0.31553718 0.65950245 0.34952127]
4521 x_new: [[0.31616776 0.6589361 0.34801645]]
4522 fx_new [0.00057001]
4523 Back to top
4524
4525 xs: [[0.31568651 0.65999852 0.34739142]
4526 [0.31616776 0.6589361 0.34801645]
4527 [0.31542198 0.65739204 0.34798455]
4528 [0.31564377 0.66056933 0.34983878]
4529 [0.31604755 0.65979555 0.35011778]
4530 [0.31560804 0.66009217 0.35043195]
4531 [0.31544579 0.65860074 0.34985833]]
4532 fxs: [0.0005535 0.00057001 0.00062149 0.00062253 0.00062773 0.00064977

```

```

4533 0.0006581 ]
4534 Centroid: [0.31571734 0.65934064 0.34909132]
4535 x_new: [[0.31598889 0.66008053 0.34832432]]
4536 fx_new [0.00056894]
4537 Back to top
4538
4539 xs: [[0.31568651 0.65999852 0.34739142]
4540 [0.31598889 0.66008053 0.34832432]
4541 [0.31616776 0.6589361 0.34801645]
4542 [0.31542198 0.65739204 0.34798455]
4543 [0.31564377 0.66056933 0.34983878]
4544 [0.31604755 0.65979555 0.35011778]
4545 [0.31560804 0.66009217 0.35043195]]
4546 fxs: [0.0005535 0.00056894 0.00057001 0.00062149 0.00062253 0.00062773
4547 0.00064977]
4548 Centroid: [0.31579493 0.65955203 0.34887218]
4549 x_new: [[0.31598182 0.6590119 0.34731241]]
4550 fx_new [0.00055509]
4551 Back to top
4552
4553 xs: [[0.31568651 0.65999852 0.34739142]
4554 [0.31598182 0.6590119 0.34731241]
4555 [0.31598889 0.66008053 0.34832432]
4556 [0.31616776 0.6589361 0.34801645]
4557 [0.31542198 0.65739204 0.34798455]
4558 [0.31564377 0.66056933 0.34983878]
4559 [0.31604755 0.65979555 0.35011778]]
4560 fxs: [0.0005535 0.00055509 0.00056894 0.00057001 0.00062149 0.00062253
4561 0.00062773]
4562 Centroid: [0.31584833 0.65939771 0.34842653]
4563 x_new: [[0.3156491 0.65899987 0.34673528]]
4564 fx_new [0.00055112]
4565 Expanding
4566
4567 xs: [[0.31544987 0.65860204 0.34504403]
4568 [0.31568651 0.65999852 0.34739142]
4569 [0.31598182 0.6590119 0.34731241]
4570 [0.31598889 0.66008053 0.34832432]
4571 [0.31616776 0.6589361 0.34801645]
4572 [0.31542198 0.65739204 0.34798455]
4573 [0.31564377 0.66056933 0.34983878]]
4574 fxs: [0.000522 0.0005535 0.00055509 0.00056894 0.00057001 0.00062149
4575 0.00062253]
4576 Centroid: [0.31576294 0.65922721 0.34770171]
4577 x_new: [[0.31588212 0.65788508 0.34556463]]
4578 fx_new [0.00053127]
4579 Back to top
4580
4581 xs: [[0.31544987 0.65860204 0.34504403]
4582 [0.31588212 0.65788508 0.34556463]
4583 [0.31568651 0.65999852 0.34739142]
4584 [0.31598182 0.6590119 0.34731241]
4585 [0.31598889 0.66008053 0.34832432]
4586 [0.31616776 0.6589361 0.34801645]
4587 [0.31542198 0.65739204 0.34798455]]
4588 fxs: [0.000522 0.00053127 0.0005535 0.00055509 0.00056894 0.00057001
4589 0.00062149]
4590 Centroid: [0.315797 0.65884374 0.34709112]
4591 x_new: [[0.31617201 0.66029545 0.34619768]]
4592 fx_new [0.00050059]
4593 Expanding
4594
4595 xs: [[0.31654702 0.66174716 0.34530424]
4596 [0.31544987 0.65860204 0.34504403]
4597 [0.31588212 0.65788508 0.34556463]
4598 [0.31568651 0.65999852 0.34739142]
4599 [0.31598182 0.6590119 0.34731241]
4600 [0.31598889 0.66008053 0.34832432]
4601 [0.31616776 0.6589361 0.34801645]]
4602 fxs: [0.00044928 0.000522 0.00053127 0.0005535 0.00055509 0.00056894

```

```

4603 0.00057001]
4604 Centroid: [0.31595772 0.6594659 0.34670821]
4605 x_new: [[0.31574767 0.65999571 0.34539998]]
4606 fx_new [0.00049936]
4607 Back to top
4608
4609 xs: [[0.31654702 0.66174716 0.34530424]
4610 [0.31574767 0.65999571 0.34539998]
4611 [0.31544987 0.65860204 0.34504403]
4612 [0.31588212 0.65788508 0.34556463]
4613 [0.31568651 0.65999852 0.34739142]
4614 [0.31598182 0.6590119 0.34731241]
4615 [0.31598889 0.66008053 0.34832432]]
4616 fxs: [0.00044928 0.00049936 0.000522 0.00053127 0.0005535 0.00055509
4617 0.00056894]
4618 Centroid: [0.3158977 0.65961728 0.34633443]
4619 x_new: [[0.31580651 0.65915402 0.34434455]]
4620 fx_new [0.00048488]
4621 Back to top
4622
4623 xs: [[0.31654702 0.66174716 0.34530424]
4624 [0.31580651 0.65915402 0.34434455]
4625 [0.31574767 0.65999571 0.34539998]
4626 [0.31544987 0.65860204 0.34504403]
4627 [0.31588212 0.65788508 0.34556463]
4628 [0.31568651 0.65999852 0.34739142]
4629 [0.31598182 0.6590119 0.34731241]]
4630 fxs: [0.00044928 0.00048488 0.00049936 0.000522 0.00053127 0.0005535
4631 0.00055509]
4632 Centroid: [0.31587165 0.65948492 0.34576589]
4633 x_new: [[0.31576148 0.65995794 0.34421938]]
4634 fx_new [0.00047228]
4635 Back to top
4636
4637 xs: [[0.31654702 0.66174716 0.34530424]
4638 [0.31576148 0.65995794 0.34421938]
4639 [0.31580651 0.65915402 0.34434455]
4640 [0.31574767 0.65999571 0.34539998]
4641 [0.31544987 0.65860204 0.34504403]
4642 [0.31588212 0.65788508 0.34556463]
4643 [0.31568651 0.65999852 0.34739142]]
4644 fxs: [0.00044928 0.00047228 0.00048488 0.00049936 0.000522 0.00053127
4645 0.0005535 ]
4646 Centroid: [0.31584017 0.65962007 0.34532403]
4647 x_new: [[0.31593383 0.65924161 0.34325665]]
4648 fx_new [0.00045426]
4649 Back to top
4650
4651 xs: [[0.31654702 0.66174716 0.34530424]
4652 [0.31599383 0.65924161 0.34325665]
4653 [0.31576148 0.65995794 0.34421938]
4654 [0.31580651 0.65915402 0.34434455]
4655 [0.31574767 0.65999571 0.34539998]
4656 [0.31544987 0.65860204 0.34504403]
4657 [0.31588212 0.65788508 0.34556463]]
4658 fxs: [0.00044928 0.00045426 0.00047228 0.00048488 0.00049936 0.000522
4659 0.00053127]
4660 Centroid: [0.31588407 0.65951194 0.34473335]
4661 x_new: [[0.31588602 0.66113879 0.34390207]]
4662 fx_new [0.00044666]
4663 Expanding
4664
4665 xs: [[0.31588797 0.66276564 0.34307078]
4666 [0.31654702 0.66174716 0.34530424]
4667 [0.31599383 0.65924161 0.34325665]
4668 [0.31576148 0.65995794 0.34421938]
4669 [0.31580651 0.65915402 0.34434455]
4670 [0.31574767 0.65999571 0.34539998]
4671 [0.31544987 0.65860204 0.34504403]]
4672 fxs: [0.00041438 0.00044928 0.00045426 0.00047228 0.00048488 0.00049936

```

```

4673 0.000522 ]
4674 Centroid: [0.31588491 0.66020916 0.34437709]
4675 x_new: [[0.31631994 0.66181628 0.34371015]]
4676 fx_new [0.00042066]
4677 Back to top
4678
4679 xs: [[0.31588797 0.66276564 0.34307078]
4680 [0.31631994 0.66181628 0.34371015]
4681 [0.31654702 0.66174716 0.34530424]
4682 [0.31599383 0.65924161 0.34325665]
4683 [0.31576148 0.65995794 0.34421938]
4684 [0.31580651 0.65915402 0.34434455]
4685 [0.31574767 0.65999571 0.34539998]]
4686 fxs: [0.00041438 0.00042066 0.00044928 0.00045426 0.00047228 0.00048488
4687 0.00049936]
4688 Centroid: [0.3160092 0.66066834 0.34418653]
4689 x_new: [[0.31627073 0.66134097 0.34297308]]
4690 fx_new [0.00041242]
4691 Expanding
4692
4693 xs: [[0.31653226 0.6620136 0.34175963]
4694 [0.31588797 0.66276564 0.34307078]
4695 [0.31631994 0.66181628 0.34371015]
4696 [0.31654702 0.66174716 0.34530424]
4697 [0.31599383 0.65924161 0.34325665]
4698 [0.31576148 0.65995794 0.34421938]
4699 [0.31580651 0.65915402 0.34434455]]
4700 fxs: [0.00037493 0.00041438 0.00042066 0.00044928 0.00045426 0.00047228
4701 0.00048488]
4702 Centroid: [0.31612129 0.66095661 0.34366648]
4703 x_new: [[0.31643606 0.66275919 0.34298842]]
4704 fx_new [0.00039401]
4705 Back to top
4706
4707 xs: [[0.31653226 0.6620136 0.34175963]
4708 [0.31643606 0.66275919 0.34298842]
4709 [0.31588797 0.66276564 0.34307078]
4710 [0.31631994 0.66181628 0.34371015]
4711 [0.31654702 0.66174716 0.34530424]
4712 [0.31599383 0.65924161 0.34325665]
4713 [0.31576148 0.65995794 0.34421938]]
4714 fxs: [0.00037493 0.00039401 0.00041438 0.00042066 0.00044928 0.00045426
4715 0.00047228]
4716 Centroid: [0.31621122 0.66147163 0.34347275]
4717 x_new: [[0.31666097 0.66298533 0.34272612]]
4718 fx_new [0.00037974]
4719 Back to top
4720
4721 xs: [[0.31653226 0.6620136 0.34175963]
4722 [0.31666097 0.66298533 0.34272612]
4723 [0.31643606 0.66275919 0.34298842]
4724 [0.31588797 0.66276564 0.34307078]
4725 [0.31631994 0.66181628 0.34371015]
4726 [0.31654702 0.66174716 0.34530424]
4727 [0.31599383 0.65924161 0.34325665]]
4728 fxs: [0.00037493 0.00037974 0.00039401 0.00041438 0.00042066 0.00044928
4729 0.00045426]
4730 Centroid: [0.31633972 0.66190412 0.34325943]
4731 x_new: [[0.31668562 0.66456662 0.34326221]]
4732 fx_new [0.00038014]
4733 Back to top
4734
4735 xs: [[0.31653226 0.6620136 0.34175963]
4736 [0.31666097 0.66298533 0.34272612]
4737 [0.31668562 0.66456662 0.34326221]
4738 [0.31643606 0.66275919 0.34298842]
4739 [0.31588797 0.66276564 0.34307078]
4740 [0.31631994 0.66181628 0.34371015]
4741 [0.31654702 0.66174716 0.34530424]]
4742 fxs: [0.00037493 0.00037974 0.00038014 0.00039401 0.00041438 0.00042066

```

```

4743 0.00044928]
4744 Centroid: [0.31643855 0.66266483 0.34326022]
4745 x_new: [[0.31633008 0.66358251 0.3412162 ]]
4746 fx_new [0.00036076]
4747 Expanding
4748
4749 xs: [[0.31622161 0.66450018 0.33917218]
4750 [0.31653226 0.6620136 0.34175963]
4751 [0.31666097 0.66298533 0.34272612]
4752 [0.31668562 0.66456662 0.34326221]
4753 [0.31643606 0.66275919 0.34298842]
4754 [0.31588797 0.66276564 0.34307078]
4755 [0.31631994 0.66181628 0.34371015]]
4756 fxs: [0.0003316 0.00037493 0.00037974 0.00038014 0.00039401 0.00041438
4757 0.00042066]
4758 Centroid: [0.31639206 0.66305812 0.34238421]
4759 x_new: [[0.31646418 0.66429996 0.34105828]]
4760 fx_new [0.00034984]
4761 Back to top
4762
4763 xs: [[0.31622161 0.66450018 0.33917218]
4764 [0.31646418 0.66429996 0.34105828]
4765 [0.31653226 0.6620136 0.34175963]
4766 [0.31666097 0.66298533 0.34272612]
4767 [0.31668562 0.66456662 0.34326221]
4768 [0.31643606 0.66275919 0.34298842]
4769 [0.31588797 0.66276564 0.34307078]]
4770 fxs: [0.0003316 0.00034984 0.00037493 0.00037974 0.00038014 0.00039401
4771 0.00041438]
4772 Centroid: [0.31641267 0.66341293 0.34200538]
4773 x_new: [[0.31693736 0.66406022 0.34093997]]
4774 fx_new [0.00033348]
4775 Back to top
4776
4777 xs: [[0.31622161 0.66450018 0.33917218]
4778 [0.31693736 0.66406022 0.34093997]
4779 [0.31646418 0.66429996 0.34105828]
4780 [0.31653226 0.6620136 0.34175963]
4781 [0.31666097 0.66298533 0.34272612]
4782 [0.31668562 0.66456662 0.34326221]
4783 [0.31643606 0.66275919 0.34298842]]
4784 fxs: [0.0003316 0.00033348 0.00034984 0.00037493 0.00037974 0.00038014
4785 0.00039401]
4786 Centroid: [0.31656258 0.66359787 0.34170097]
4787 x_new: [[0.3166891 0.66443655 0.34041353]]
4788 fx_new [0.00033213]
4789 Back to top
4790
4791 xs: [[0.31622161 0.66450018 0.33917218]
4792 [0.3166891 0.66443655 0.34041353]
4793 [0.31693736 0.66406022 0.34093997]
4794 [0.31646418 0.66429996 0.34105828]
4795 [0.31653226 0.6620136 0.34175963]
4796 [0.31666097 0.66298533 0.34272612]
4797 [0.31668562 0.66456662 0.34326221]]
4798 fxs: [0.0003316 0.00033213 0.00033348 0.00034984 0.00037493 0.00037974
4799 0.00038014]
4800 Centroid: [0.31659873 0.6638375 0.34133313]
4801 x_new: [[0.31651184 0.66310837 0.33940406]]
4802 fx_new [0.00033248]
4803 Back to top
4804
4805 xs: [[0.31622161 0.66450018 0.33917218]
4806 [0.3166891 0.66443655 0.34041353]
4807 [0.31651184 0.66310837 0.33940406]
4808 [0.31693736 0.66406022 0.34093997]
4809 [0.31646418 0.66429996 0.34105828]
4810 [0.31653226 0.6620136 0.34175963]
4811 [0.31666097 0.66298533 0.34272612]]
4812 fxs: [0.0003316 0.00033213 0.00033248 0.00033348 0.00034984 0.00037493

```

```

4813 0.00037974]
4814 Centroid: [0.3165739 0.66362917 0.34078197]
4815 x_new: [[0.31648684 0.66427302 0.33883781]]
4816 fx_new [0.00031983]
4817 Expanding
4818
4819 xs: [[0.31639977 0.66491686 0.33689366]
4820 [0.31622161 0.66450018 0.33917218]
4821 [0.3166891 0.66443655 0.34041353]
4822 [0.31651184 0.66310837 0.33940406]
4823 [0.31693736 0.66406022 0.34093997]
4824 [0.31646418 0.66429996 0.34105828]
4825 [0.31653226 0.6620136 0.34175963]]
4826 fxs: [0.00030248 0.0003316 0.00033213 0.00033248 0.00033348 0.00034984
4827 0.00037493]
4828 Centroid: [0.31653659 0.66390511 0.33994876]
4829 x_new: [[0.31654092 0.66579661 0.33813788]]
4830 fx_new [0.00030583]
4831 Back to top
4832
4833 xs: [[0.31639977 0.66491686 0.33689366]
4834 [0.31654092 0.66579661 0.33813788]
4835 [0.31622161 0.66450018 0.33917218]
4836 [0.3166891 0.66443655 0.34041353]
4837 [0.31651184 0.66310837 0.33940406]
4838 [0.31693736 0.66406022 0.34093997]
4839 [0.31646418 0.66429996 0.34105828]]
4840 fxs: [0.00030248 0.00030583 0.0003316 0.00033213 0.00033248 0.00033348
4841 0.00034984]
4842 Centroid: [0.31653783 0.66444554 0.33943137]
4843 x_new: [[0.31661147 0.66459111 0.33780445]]
4844 fx_new [0.00030392]
4845 Back to top
4846
4847 xs: [[0.31639977 0.66491686 0.33689366]
4848 [0.31661147 0.66459111 0.33780445]
4849 [0.31654092 0.66579661 0.33813788]
4850 [0.31622161 0.66450018 0.33917218]
4851 [0.3166891 0.66443655 0.34041353]
4852 [0.31651184 0.66310837 0.33940406]
4853 [0.31693736 0.66406022 0.34093997]]
4854 fxs: [0.00030248 0.00030392 0.00030583 0.0003316 0.00033213 0.00033248
4855 0.00033348]
4856 Centroid: [0.31655887 0.66448713 0.33896653]
4857 x_new: [[0.31618037 0.66491404 0.3369931 ]]
4858 fx_new [0.00031069]
4859 Back to top
4860
4861 xs: [[0.31639977 0.66491686 0.33689366]
4862 [0.31661147 0.66459111 0.33780445]
4863 [0.31654092 0.66579661 0.33813788]
4864 [0.31618037 0.66491404 0.3369931 ]
4865 [0.31622161 0.66450018 0.33917218]
4866 [0.3166891 0.66443655 0.34041353]
4867 [0.31651184 0.66310837 0.33940406]]
4868 fxs: [0.00030248 0.00030392 0.00030583 0.00031069 0.0003316 0.00033213
4869 0.00033248]
4870 Centroid: [0.31645072 0.6646091 0.33840269]
4871 x_new: [[0.31638961 0.66610984 0.33740133]]
4872 fx_new [0.00030395]
4873 Back to top
4874
4875 xs: [[0.31639977 0.66491686 0.33689366]
4876 [0.31661147 0.66459111 0.33780445]
4877 [0.31638961 0.66610984 0.33740133]
4878 [0.31654092 0.66579661 0.33813788]
4879 [0.31618037 0.66491404 0.3369931 ]
4880 [0.31622161 0.66450018 0.33917218]
4881 [0.3166891 0.66443655 0.34041353]]
4882 fxs: [0.00030248 0.00030392 0.00030395 0.00030583 0.00031069 0.0003316

```

```

4883 0.00033213]
4884 Centroid: [0.31643326 0.66503789 0.33811659]
4885 x_new: [[0.31617742 0.66563922 0.33581965]]
4886 fx_new [0.00030156]
4887 Expanding
4888
4889 xs: [[0.31617742 0.66563922 0.33581965]
4890 [0.31639977 0.66491686 0.33689366]
4891 [0.31661147 0.66459111 0.33780445]
4892 [0.31638961 0.66610984 0.33740133]
4893 [0.31654092 0.66579661 0.33813788]
4894 [0.31618037 0.66491404 0.3369931 ]
4895 [0.31622161 0.66450018 0.33917218]]
4896 fxs: [0.00030156 0.00030248 0.00030392 0.00030395 0.00030583 0.00031069
4897 0.0003316 ]
4898 Centroid: [0.31636017 0.6652097 0.33746032]
4899 x_new: [[0.31649873 0.66591921 0.33574846]]
4900 fx_new [0.0002898]
4901 Expanding
4902
4903 xs: [[0.31663729 0.66662873 0.3340366 ]
4904 [0.31617742 0.66563922 0.33581965]
4905 [0.31639977 0.66491686 0.33689366]
4906 [0.31661147 0.66459111 0.33780445]
4907 [0.31638961 0.66610984 0.33740133]
4908 [0.31654092 0.66579661 0.33813788]
4909 [0.31618037 0.66491404 0.3369931 ]]
4910 fxs: [0.00027925 0.00030156 0.00030248 0.00030392 0.00030395 0.00030583
4911 0.00031069]
4912 Centroid: [0.31641955 0.66551377 0.33672667]
4913 x_new: [[0.31665873 0.66611351 0.33646024]]
4914 fx_new [0.00028813]
4915 Back to top
4916
4917 xs: [[0.31663729 0.66662873 0.3340366 ]
4918 [0.31665873 0.66611351 0.33646024]
4919 [0.31617742 0.66563922 0.33581965]
4920 [0.31639977 0.66491686 0.33689366]
4921 [0.31661147 0.66459111 0.33780445]
4922 [0.31638961 0.66610984 0.33740133]
4923 [0.31654092 0.66579661 0.33813788]]
4924 fxs: [0.00027925 0.00028813 0.00030156 0.00030248 0.00030392 0.00030395
4925 0.00030583]
4926 Centroid: [0.31648789 0.66568513 0.33665055]
4927 x_new: [[0.31643486 0.66557364 0.33516321]]
4928 fx_new [0.0002901]
4929 Back to top
4930
4931 xs: [[0.31663729 0.66662873 0.3340366 ]
4932 [0.31665873 0.66611351 0.33646024]
4933 [0.31643486 0.66557364 0.33516321]
4934 [0.31617742 0.66563922 0.33581965]
4935 [0.31639977 0.66491686 0.33689366]
4936 [0.31661147 0.66459111 0.33780445]
4937 [0.31638961 0.66610984 0.33740133]]
4938 fxs: [0.00027925 0.00028813 0.0002901 0.00030156 0.00030248 0.00030392
4939 0.00030395]
4940 Centroid: [0.31647273 0.66565327 0.33622559]
4941 x_new: [[0.31655586 0.66519671 0.33504985]]
4942 fx_new [0.00028659]
4943 Back to top
4944
4945 xs: [[0.31663729 0.66662873 0.3340366 ]
4946 [0.31655586 0.66519671 0.33504985]
4947 [0.31665873 0.66611351 0.33646024]
4948 [0.31643486 0.66557364 0.33516321]
4949 [0.31617742 0.66563922 0.33581965]
4950 [0.31639977 0.66491686 0.33689366]
4951 [0.31661147 0.66459111 0.33780445]]
4952 fxs: [0.00027925 0.00028659 0.00028813 0.0002901 0.00030156 0.00030248

```

```

4953 0.00030392]
4954 Centroid: [0.31649649 0.66552283 0.33588967]
4955 x_new: [[0.3163815 0.66645454 0.33397488]]
4956 fx_new [0.00028782]
4957 Back to top
4958
4959 xs: [[0.31663729 0.66662873 0.3340366 ]
4960 [0.31655586 0.66519671 0.33504985]
4961 [0.3163815 0.66645454 0.33397488]
4962 [0.31665873 0.66611351 0.33646024]
4963 [0.31643486 0.66557364 0.33516321]
4964 [0.31617742 0.66563922 0.33581965]
4965 [0.31639977 0.66491686 0.33689366]]
4966 fxs: [0.00027925 0.00028659 0.00028782 0.00028813 0.0002901 0.00030156
4967 0.00030248]
4968 Centroid: [0.31646363 0.66578903 0.33534258]
4969 x_new: [[0.3165275 0.66666119 0.33379151]]
4970 fx_new [0.00028265]
4971 Back to top
4972
4973 xs: [[0.31663729 0.66662873 0.3340366 ]
4974 [0.3165275 0.66666119 0.33379151]
4975 [0.31655586 0.66519671 0.33504985]
4976 [0.3163815 0.66645454 0.33397488]
4977 [0.31665873 0.66611351 0.33646024]
4978 [0.31643486 0.66557364 0.33516321]
4979 [0.31617742 0.66563922 0.33581965]]
4980 fxs: [0.00027925 0.00028265 0.00028659 0.00028782 0.00028813 0.0002901
4981 0.00030156]
4982 Centroid: [0.31648188 0.66603822 0.33489942]
4983 x_new: [[0.31678633 0.66643722 0.33397919]]
4984 fx_new [0.00027427]
4985 Expanding
4986
4987 xs: [[0.31709079 0.66683621 0.33305896]
4988 [0.31663729 0.66662873 0.3340366 ]
4989 [0.3165275 0.66666119 0.33379151]
4990 [0.31655586 0.66519671 0.33504985]
4991 [0.3163815 0.66645454 0.33397488]
4992 [0.31665873 0.66611351 0.33646024]
4993 [0.31643486 0.66557364 0.33516321]]
4994 fxs: [0.00026392 0.00027925 0.00028265 0.00028659 0.00028782 0.00028813
4995 0.0002901 ]
4996 Centroid: [0.31661236 0.66620922 0.33450503]
4997 x_new: [[0.31678986 0.6668448 0.33384686]]
4998 fx_new [0.00027398]
4999 Back to top
5000
5001 xs: [[0.31709079 0.66683621 0.33305896]
5002 [0.31678986 0.6668448 0.33384686]
5003 [0.31663729 0.66662873 0.3340366 ]
5004 [0.3165275 0.66666119 0.33379151]
5005 [0.31655586 0.66519671 0.33504985]
5006 [0.3163815 0.66645454 0.33397488]
5007 [0.31665873 0.66611351 0.33646024]]
5008 fxs: [0.00026392 0.00027398 0.00027925 0.00028265 0.00028659 0.00028782
5009 0.00028813]
5010 Centroid: [0.31666308 0.66639081 0.33431699]
5011 x_new: [[0.31666742 0.66666811 0.33217373]]
5012 fx_new [0.0002791]
5013 Back to top
5014
5015 xs: [[0.31709079 0.66683621 0.33305896]
5016 [0.31678986 0.6668448 0.33384686]
5017 [0.31666742 0.66666811 0.33217373]
5018 [0.31663729 0.66662873 0.3340366 ]
5019 [0.3165275 0.66666119 0.33379151]
5020 [0.31655586 0.66519671 0.33504985]
5021 [0.3163815 0.66645454 0.33397488]]
5022 fxs: [0.00026392 0.00027398 0.0002791 0.00027925 0.00028265 0.00028659

```



```

5023 0.00028782]
5024 Centroid: [0.31666432 0.66647004 0.33370463]
5025 x_new: [[0.31694713 0.66648554 0.33343437]]
5026 fx_new [0.00026855]
5027 Back to top
5028
5029 xs: [[0.31709079 0.66683621 0.33305896]
5030 [0.31694713 0.66648554 0.33343437]
5031 [0.31678986 0.6668448 0.33384686]
5032 [0.31666742 0.66666811 0.33217373]
5033 [0.31663729 0.66662873 0.3340366 ]
5034 [0.3165275 0.66666119 0.33379151]
5035 [0.31655586 0.66519671 0.33504985]]
5036 fxs: [0.00026392 0.00026855 0.00027398 0.0002791 0.00027925 0.00028265
5037 0.00028659]
5038 Centroid: [0.31674512 0.66647447 0.33362741]
5039 x_new: [[0.31693438 0.66775224 0.33220497]]
5040 fx_new [0.00027138]
5041 Back to top
5042
5043 xs: [[0.31709079 0.66683621 0.33305896]
5044 [0.31694713 0.66648554 0.33343437]
5045 [0.31693438 0.66775224 0.33220497]
5046 [0.31678986 0.6668448 0.33384686]
5047 [0.31666742 0.66666811 0.33217373]
5048 [0.31663729 0.66662873 0.3340366 ]
5049 [0.3165275 0.66666119 0.33379151]]
5050 fxs: [0.00026392 0.00026855 0.00027138 0.00027398 0.0002791 0.00027925
5051 0.00028265]
5052 Centroid: [0.3167992 0.66683955 0.333221 ]
5053 x_new: [[0.31707089 0.6670179 0.33265049]]
5054 fx_new [0.00026506]
5055 Back to top
5056
5057 xs: [[0.31709079 0.66683621 0.33305896]
5058 [0.31707089 0.6670179 0.33265049]
5059 [0.31694713 0.66648554 0.33343437]
5060 [0.31693438 0.66775224 0.33220497]
5061 [0.31678986 0.6668448 0.33384686]
5062 [0.31666742 0.66666811 0.33217373]
5063 [0.31663729 0.66662873 0.3340366 ]]
5064 fxs: [0.00026392 0.00026506 0.00026855 0.00027138 0.00027398 0.0002791
5065 0.00027925]
5066 Centroid: [0.31687682 0.6668905 0.333058 ]
5067 x_new: [[0.31711636 0.66715228 0.3320794 ]]
5068 fx_new [0.0002648]
5069 Back to top
5070
5071 xs: [[0.31709079 0.66683621 0.33305896]
5072 [0.31711636 0.66715228 0.3320794 ]
5073 [0.31707089 0.6670179 0.33265049]
5074 [0.31694713 0.66648554 0.33343437]
5075 [0.31693438 0.66775224 0.33220497]
5076 [0.31678986 0.6668448 0.33384686]
5077 [0.31666742 0.66666811 0.33217373]]
5078 fxs: [0.00026392 0.0002648 0.00026506 0.00026855 0.00027138 0.00027398
5079 0.0002791 ]
5080 Centroid: [0.31694526 0.6669653 0.3327784 ]
5081 x_new: [[0.3172231 0.66726248 0.33338306]]
5082 fx_new [0.0002599]
5083 Expanding
5084
5085 xs: [[0.31750095 0.66755967 0.33398773]
5086 [0.31709079 0.66683621 0.33305896]
5087 [0.31711636 0.66715228 0.3320794 ]
5088 [0.31707089 0.6670179 0.33265049]
5089 [0.31694713 0.66648554 0.33343437]
5090 [0.31693438 0.66775224 0.33220497]
5091 [0.31678986 0.6668448 0.33384686]]
5092 fxs: [0.00025189 0.00026392 0.0002648 0.00026506 0.00026855 0.00027138

```

```

5093 0.00027398]
5094 Centroid: [0.31706434 0.66709266 0.33303754]
5095 x_new: [[0.31733881 0.66734053 0.33222822]]
5096 fx_new [0.0002575]
5097 Back to top
5098
5099 xs: [[0.31750095 0.66755967 0.33398773]
5100 [0.31733881 0.66734053 0.33222822]
5101 [0.31709079 0.66683621 0.33305896]
5102 [0.31711636 0.66715228 0.3320794 ]
5103 [0.31707089 0.6670179 0.33265049]
5104 [0.31694713 0.66648554 0.33343437]
5105 [0.31693438 0.66775224 0.33220497]]
5106 fxs: [0.00025189 0.0002575 0.00026392 0.0002648 0.00026506 0.00026855
5107 0.00027138]
5108 Centroid: [0.31714276 0.66716348 0.33280631]
5109 x_new: [[0.31735114 0.66657473 0.33340764]]
5110 fx_new [0.00025544]
5111 Back to top
5112
5113 xs: [[0.31750095 0.66755967 0.33398773]
5114 [0.31735114 0.66657473 0.33340764]
5115 [0.31733881 0.66734053 0.33222822]
5116 [0.31709079 0.66683621 0.33305896]
5117 [0.31711636 0.66715228 0.3320794 ]
5118 [0.31707089 0.6670179 0.33265049]
5119 [0.31694713 0.66648554 0.33343437]]
5120 fxs: [0.00025189 0.00025544 0.0002575 0.00026392 0.0002648 0.00026506
5121 0.00026855]
5122 Centroid: [0.3172023 0.66699527 0.33297812]
5123 x_new: [[0.31745746 0.66750499 0.33252186]]
5124 fx_new [0.0002534]
5125 Back to top
5126
5127 xs: [[0.31750095 0.66755967 0.33398773]
5128 [0.31745746 0.66750499 0.33252186]
5129 [0.31735114 0.66657473 0.33340764]
5130 [0.31733881 0.66734053 0.33222822]
5131 [0.31709079 0.66683621 0.33305896]
5132 [0.31711636 0.66715228 0.3320794 ]
5133 [0.31707089 0.6670179 0.33265049]]
5134 fxs: [0.00025189 0.0002534 0.00025544 0.0002575 0.00026392 0.0002648
5135 0.00026506]
5136 Centroid: [0.3172752 0.6671409 0.33284776]
5137 x_new: [[0.31747951 0.6672639 0.33304502]]
5138 fx_new [0.00025178]
5139 Expanding
5140
5141 xs: [[0.31768381 0.66738691 0.33324228]
5142 [0.31750095 0.66755967 0.33398773]
5143 [0.31745746 0.66750499 0.33252186]
5144 [0.31735114 0.66657473 0.33340764]
5145 [0.31733881 0.66734053 0.33222822]
5146 [0.31709079 0.66683621 0.33305896]
5147 [0.31711636 0.66715228 0.3320794 ]]
5148 fxs: [0.00024543 0.00025189 0.0002534 0.00025544 0.0002575 0.00026392
5149 0.0002648 ]
5150 Centroid: [0.31736276 0.66719362 0.3329323 ]
5151 x_new: [[0.31760916 0.66723495 0.3337852 ]]
5152 fx_new [0.00024778]
5153 Back to top
5154
5155 xs: [[0.31768381 0.66738691 0.33324228]
5156 [0.31760916 0.66723495 0.3337852 ]
5157 [0.31750095 0.66755967 0.33398773]
5158 [0.31745746 0.66750499 0.33252186]
5159 [0.31735114 0.66657473 0.33340764]
5160 [0.31733881 0.66734053 0.33222822]
5161 [0.31709079 0.66683621 0.33305896]]
5162 fxs: [0.00024543 0.00024778 0.00025189 0.0002534 0.00025544 0.0002575

```

```

5163 0.00026392]
5164 Centroid: [0.31743316 0.66720543 0.33317598]
5165 x_new: [[0.31777553 0.66757464 0.33329301]]
5166 fx_new [0.00024287]
5167 Expanding
5168
5169 xs: [[0.3181179 0.66794385 0.33341003]
5170 [0.31768381 0.66738691 0.33324228]
5171 [0.31760916 0.66723495 0.3337852 ]
5172 [0.31750095 0.66755967 0.33398773]
5173 [0.31745746 0.66750499 0.33252186]
5174 [0.31735114 0.66657473 0.33340764]
5175 [0.31733881 0.66734053 0.33222822]]
5176 fxs: [0.00023315 0.00024543 0.00024778 0.00025189 0.0002534 0.00025544
5177 0.0002575 ]
5178 Centroid: [0.31757989 0.66736366 0.33322614]
5179 x_new: [[0.31782097 0.66738679 0.33422405]]
5180 fx_new [0.00024195]
5181 Back to top
5182
5183 xs: [[0.3181179 0.66794385 0.33341003]
5184 [0.31782097 0.66738679 0.33422405]
5185 [0.31768381 0.66738691 0.33324228]
5186 [0.31760916 0.66723495 0.3337852 ]
5187 [0.31750095 0.66755967 0.33398773]
5188 [0.31745746 0.66750499 0.33252186]
5189 [0.31735114 0.66657473 0.33340764]]
5190 fxs: [0.00023315 0.00024195 0.00024543 0.00024778 0.00025189 0.0002534
5191 0.00025544]
5192 Centroid: [0.31764877 0.66737027 0.33351126]
5193 x_new: [[0.3179464 0.66816581 0.33361487]]
5194 fx_new [0.00023908]
5195 Back to top
5196
5197 xs: [[0.3181179 0.66794385 0.33341003]
5198 [0.3179464 0.66816581 0.33361487]
5199 [0.31782097 0.66738679 0.33422405]
5200 [0.31768381 0.66738691 0.33324228]
5201 [0.31760916 0.66723495 0.3337852 ]
5202 [0.31750095 0.66755967 0.33398773]
5203 [0.31745746 0.66750499 0.33252186]]
5204 fxs: [0.00023315 0.00023908 0.00024195 0.00024543 0.00024778 0.00025189
5205 0.0002534 ]
5206 Centroid: [0.31773381 0.66759756 0.33354086]
5207 x_new: [[0.31801015 0.66769014 0.33455986]]
5208 fx_new [0.00023735]
5209 Back to top
5210
5211 xs: [[0.3181179 0.66794385 0.33341003]
5212 [0.31801015 0.66769014 0.33455986]
5213 [0.3179464 0.66816581 0.33361487]
5214 [0.31782097 0.66738679 0.33422405]
5215 [0.31768381 0.66738691 0.33324228]
5216 [0.31760916 0.66723495 0.3337852 ]
5217 [0.31750095 0.66755967 0.33398773]]
5218 fxs: [0.00023315 0.00023735 0.00023908 0.00024195 0.00024543 0.00024778
5219 0.00025189]
5220 Centroid: [0.31781276 0.66762401 0.333832 ]
5221 x_new: [[0.31812458 0.66768836 0.33367628]]
5222 fx_new [0.00023247]
5223 Expanding
5224
5225 xs: [[0.3184364 0.66775271 0.33352055]
5226 [0.3181179 0.66794385 0.33341003]
5227 [0.31801015 0.66769014 0.33455986]
5228 [0.3179464 0.66816581 0.33361487]
5229 [0.31782097 0.66738679 0.33422405]
5230 [0.31768381 0.66738691 0.33324228]
5231 [0.31760916 0.66723495 0.3337852 ]
5232 fxs: [0.00022313 0.00023315 0.00023735 0.00023908 0.00024195 0.00024543

```

```

5233 0.00024778]
5234 Centroid: [0.3179464 0.66765159 0.33376526]
5235 x_new: [[0.31828364 0.66806824 0.33374533]]
5236 fx_new [0.00022863]
5237 Back to top
5238
5239 xs: [[0.3184364 0.66775271 0.33352055]
5240 [0.31828364 0.66806824 0.33374533]
5241 [0.3181179 0.66794385 0.33341003]
5242 [0.31801015 0.66769014 0.33455986]
5243 [0.3179464 0.66816581 0.33361487]
5244 [0.31782097 0.66738679 0.33422405]
5245 [0.31768381 0.66738691 0.33324228]]
5246 fxs: [0.00022313 0.00022863 0.00023315 0.00023735 0.00023908 0.00024195
5247 0.00024543]
5248 Centroid: [0.31804275 0.66777063 0.33375957]
5249 x_new: [[0.31840169 0.66815436 0.33427686]]
5250 fx_new [0.00022606]
5251 Back to top
5252
5253 xs: [[0.3184364 0.66775271 0.33352055]
5254 [0.31840169 0.66815436 0.33427686]
5255 [0.31828364 0.66806824 0.33374533]
5256 [0.3181179 0.66794385 0.33341003]
5257 [0.31801015 0.66769014 0.33455986]
5258 [0.3179464 0.66816581 0.33361487]
5259 [0.31782097 0.66738679 0.33422405]]
5260 fxs: [0.00022313 0.00022606 0.00022863 0.00023315 0.00023735 0.00023908
5261 0.00024195]
5262 Centroid: [0.31814531 0.66788027 0.33390737]
5263 x_new: [[0.31846965 0.66837375 0.33359068]]
5264 fx_new [0.00022391]
5265 Back to top
5266
5267 xs: [[0.3184364 0.66775271 0.33352055]
5268 [0.31846965 0.66837375 0.33359068]
5269 [0.31840169 0.66815436 0.33427686]
5270 [0.31828364 0.66806824 0.33374533]
5271 [0.3181179 0.66794385 0.33341003]
5272 [0.31801015 0.66769014 0.33455986]
5273 [0.3179464 0.66816581 0.33361487]]
5274 fxs: [0.00022313 0.00022391 0.00022606 0.00022863 0.00023315 0.00023735
5275 0.00023908]
5276 Centroid: [0.31823798 0.66802127 0.33381689]
5277 x_new: [[0.31852955 0.66787673 0.3340189 ]]
5278 fx_new [0.00022109]
5279 Expanding
5280
5281 xs: [[0.31882113 0.66773218 0.33422091]
5282 [0.3184364 0.66775271 0.33352055]
5283 [0.31846965 0.66837375 0.33359068]
5284 [0.31840169 0.66815436 0.33427686]
5285 [0.31828364 0.66806824 0.33374533]
5286 [0.3181179 0.66794385 0.33341003]
5287 [0.31801015 0.66769014 0.33455986]]
5288 fxs: [0.00021253 0.00022313 0.00022391 0.00022606 0.00022863 0.00023315
5289 0.00023735]
5290 Centroid: [0.31836294 0.66795932 0.33390346]
5291 x_new: [[0.31871572 0.6682285 0.33324706]]
5292 fx_new [0.00021612]
5293 Back to top
5294
5295 xs: [[0.31882113 0.66773218 0.33422091]
5296 [0.31871572 0.6682285 0.33324706]
5297 [0.3184364 0.66775271 0.33352055]
5298 [0.31846965 0.66837375 0.33359068]
5299 [0.31840169 0.66815436 0.33427686]
5300 [0.31828364 0.66806824 0.33374533]
5301 [0.3181179 0.66794385 0.33341003]]
5302 fxs: [0.00021253 0.00021612 0.00022313 0.00022391 0.00022606 0.00022863

```

```

5303 0.00023315]
5304 Centroid: [0.31846373 0.66803623 0.33371592]
5305 x_new: [[0.31880956 0.66812861 0.33402181]]
5306 fx_new [0.00021355]
5307 Back to top
5308
5309 xs: [[0.31882113 0.66773218 0.33422091]
5310 [0.31880956 0.66812861 0.33402181]
5311 [0.31871572 0.6682285 0.33324706]
5312 [0.3184364 0.66775271 0.33352055]
5313 [0.31846965 0.66837375 0.33359068]
5314 [0.31840169 0.66815436 0.33427686]
5315 [0.31828364 0.66806824 0.33374533]]
5316 fxs: [0.00021253 0.00021355 0.00021612 0.00022313 0.00022391 0.00022606
5317 0.00022863]
5318 Centroid: [0.31856254 0.66806262 0.33380332]
5319 x_new: [[0.31884144 0.66805701 0.3338613 ]]
5320 fx_new [0.00021223]
5321 Expanding
5322
5323 xs: [[0.31912034 0.6680514 0.33391928]
5324 [0.31882113 0.66773218 0.33422091]
5325 [0.31880956 0.66812861 0.33402181]
5326 [0.31871572 0.6682285 0.33324706]
5327 [0.3184364 0.66775271 0.33352055]
5328 [0.31846965 0.66837375 0.33359068]
5329 [0.31840169 0.66815436 0.33427686]]
5330 fxs: [0.00020427 0.00021253 0.00021355 0.00021612 0.00022313 0.00022391
5331 0.00022606]
5332 Centroid: [0.31868207 0.66806022 0.33382817]
5333 x_new: [[0.31896245 0.66796607 0.33337947]]
5334 fx_new [0.00020821]
5335 Back to top
5336
5337 xs: [[0.31912034 0.6680514 0.33391928]
5338 [0.31896245 0.66796607 0.33337947]
5339 [0.31882113 0.66773218 0.33422091]
5340 [0.31880956 0.66812861 0.33402181]
5341 [0.31871572 0.6682285 0.33324706]
5342 [0.3184364 0.66775271 0.33352055]
5343 [0.31846965 0.66837375 0.33359068]]
5344 fxs: [0.00020427 0.00020821 0.00021253 0.00021355 0.00021612 0.00022313
5345 0.00022391]
5346 Centroid: [0.31876218 0.66803332 0.33369997]
5347 x_new: [[0.31905471 0.66769288 0.33380925]]
5348 fx_new [0.00020516]
5349 Back to top
5350
5351 xs: [[0.31912034 0.6680514 0.33391928]
5352 [0.31905471 0.66769288 0.33380925]
5353 [0.31896245 0.66796607 0.33337947]
5354 [0.31882113 0.66773218 0.33422091]
5355 [0.31880956 0.66812861 0.33402181]
5356 [0.31871572 0.6682285 0.33324706]
5357 [0.3184364 0.66775271 0.33352055]]
5358 fxs: [0.00020427 0.00020516 0.00020821 0.00021253 0.00021355 0.00021612
5359 0.00022313]
5360 Centroid: [0.31884576 0.66793605 0.33373119]
5361 x_new: [[0.31925512 0.66811939 0.33394183]]
5362 fx_new [0.00020068]
5363 Expanding
5364
5365 xs: [[0.31966448 0.66830273 0.33415246]
5366 [0.31912034 0.6680514 0.33391928]
5367 [0.31905471 0.66769288 0.33380925]
5368 [0.31896245 0.66796607 0.33337947]
5369 [0.31882113 0.66773218 0.33422091]
5370 [0.31880956 0.66812861 0.33402181]
5371 [0.31871572 0.6682285 0.33324706]]
5372 fxs: [0.00019019 0.00020427 0.00020516 0.00020821 0.00021253 0.00021355

```

```

5373 0.00021612]
5374 Centroid: [0.3190212 0.66801462 0.33382146]
5375 x_new: [[0.31932668 0.66780075 0.33439587]]
5376 fx_new [0.0001986]
5377 Back to top
5378
5379 xs: [[0.31966448 0.66830273 0.33415246]
5380 [0.31932668 0.66780075 0.33439587]
5381 [0.31912034 0.6680514 0.33391928]
5382 [0.31905471 0.66769288 0.33380925]
5383 [0.31896245 0.66796607 0.33337947]
5384 [0.31882113 0.66773218 0.33422091]
5385 [0.31880956 0.66812861 0.33402181]]
5386 fxs: [0.00019019 0.0001986 0.00020427 0.00020516 0.00020821 0.00021253
5387 0.00021355]
5388 Centroid: [0.31910848 0.66795352 0.33398558]
5389 x_new: [[0.31940739 0.66777842 0.33394935]]
5390 fx_new [0.00019555]
5391 Back to top
5392
5393 xs: [[0.31966448 0.66830273 0.33415246]
5394 [0.31940739 0.66777842 0.33394935]
5395 [0.31932668 0.66780075 0.33439587]
5396 [0.31912034 0.6680514 0.33391928]
5397 [0.31905471 0.66769288 0.33380925]
5398 [0.31896245 0.66796607 0.33337947]
5399 [0.31882113 0.66773218 0.33422091]]
5400 fxs: [0.00019019 0.00019555 0.0001986 0.00020427 0.00020516 0.00020821
5401 0.00021253]
5402 Centroid: [0.31919388 0.66790349 0.33397523]
5403 x_new: [[0.31956664 0.6680748 0.33372954]]
5404 fx_new [0.00019166]
5405 Back to top
5406
5407 xs: [[0.31966448 0.66830273 0.33415246]
5408 [0.31956664 0.6680748 0.33372954]
5409 [0.31940739 0.66777842 0.33394935]
5410 [0.31932668 0.66780075 0.33439587]
5411 [0.31912034 0.6680514 0.33391928]
5412 [0.31905471 0.66769288 0.33380925]
5413 [0.31896245 0.66796607 0.33337947]]
5414 fxs: [0.00019019 0.00019166 0.00019555 0.0001986 0.00020427 0.00020516
5415 0.00020821]
5416 Centroid: [0.31930038 0.66795243 0.33390503]
5417 x_new: [[0.31963832 0.6679388 0.33443059]]
5418 fx_new [0.00019038]
5419 Back to top
5420
5421 xs: [[0.31966448 0.66830273 0.33415246]
5422 [0.31963832 0.6679388 0.33443059]
5423 [0.31956664 0.6680748 0.33372954]
5424 [0.31940739 0.66777842 0.33394935]
5425 [0.31932668 0.66780075 0.33439587]
5426 [0.31912034 0.6680514 0.33391928]
5427 [0.31905471 0.66769288 0.33380925]]
5428 fxs: [0.00019019 0.00019038 0.00019166 0.00019555 0.0001986 0.00020427
5429 0.00020516]
5430 Centroid: [0.31939694 0.66794854 0.33405519]
5431 x_new: [[0.31973917 0.66820419 0.33430113]]
5432 fx_new [0.0001881]
5433 Expanding
5434
5435 xs: [[0.3200814 0.66845985 0.33454708]
5436 [0.31966448 0.66830273 0.33415246]
5437 [0.31963832 0.6679388 0.33443059]
5438 [0.31956664 0.6680748 0.33372954]
5439 [0.31940739 0.66777842 0.33394935]
5440 [0.31932668 0.66780075 0.33439587]
5441 [0.31912034 0.6680514 0.33391928]]
5442 fxs: [0.0001803 0.00019019 0.00019038 0.00019166 0.00019555 0.0001986

```

```

5443 0.00020427]
5444 Centroid: [0.31954361 0.66805811 0.3341606 ]
5445 x_new: [[0.31996687 0.66806482 0.33440191]]
5446 fx_new [0.00018176]
5447 Back to top
5448
5449 xs: [[0.3200814 0.66845985 0.33454708]
5450 [0.31996687 0.66806482 0.33440191]
5451 [0.31966448 0.66830273 0.33415246]
5452 [0.31963832 0.6679388 0.33443059]
5453 [0.31956664 0.6680748 0.33372954]
5454 [0.31940739 0.66777842 0.33394935]
5455 [0.31932668 0.66780075 0.33439587]]
5456 fxs: [0.0001803 0.00018176 0.00019019 0.00019038 0.00019166 0.00019555
5457 0.0001986 ]
5458 Centroid: [0.31966454 0.66806002 0.33422954]
5459 x_new: [[0.3200024 0.6683193 0.33406322]]
5460 fx_new [0.00018098]
5461 Back to top
5462
5463 xs: [[0.3200814 0.66845985 0.33454708]
5464 [0.3200024 0.6683193 0.33406322]
5465 [0.31996687 0.66806482 0.33440191]
5466 [0.31966448 0.66830273 0.33415246]
5467 [0.31963832 0.6679388 0.33443059]
5468 [0.31956664 0.6680748 0.33372954]
5469 [0.31940739 0.66777842 0.33394935]]
5470 fxs: [0.0001803 0.00018098 0.00018176 0.00019019 0.00019038 0.00019166
5471 0.00019555]
5472 Centroid: [0.31976107 0.6681341 0.33418202]
5473 x_new: [[0.32011475 0.66848978 0.3344147 ]]
5474 fx_new [0.00017922]
5475 Expanding
5476
5477 xs: [[0.32046843 0.66884545 0.33464737]
5478 [0.3200814 0.66845985 0.33454708]
5479 [0.3200024 0.6683193 0.33406322]
5480 [0.31996687 0.66806482 0.33440191]
5481 [0.31966448 0.66830273 0.33415246]
5482 [0.31963832 0.6679388 0.33443059]
5483 [0.31956664 0.6680748 0.33372954]]
5484 fxs: [0.00017198 0.0001803 0.00018098 0.00018176 0.00019019 0.00019038
5485 0.00019166]
5486 Centroid: [0.31991265 0.66828653 0.33428174]
5487 x_new: [[0.32025866 0.66849827 0.33483394]]
5488 fx_new [0.00017655]
5489 Back to top
5490
5491 xs: [[0.32046843 0.66884545 0.33464737]
5492 [0.32025866 0.66849827 0.33483394]
5493 [0.3200814 0.66845985 0.33454708]
5494 [0.3200024 0.6683193 0.33406322]
5495 [0.31996687 0.66806482 0.33440191]
5496 [0.31966448 0.66830273 0.33415246]
5497 [0.31963832 0.6679388 0.33443059]]
5498 fxs: [0.00017198 0.00017655 0.0001803 0.00018098 0.00018176 0.00019019
5499 0.00019038]
5500 Centroid: [0.32001151 0.66834703 0.33443951]
5501 x_new: [[0.3203847 0.66875526 0.33444843]]
5502 fx_new [0.00017327]
5503 Back to top
5504
5505 xs: [[0.32046843 0.66884545 0.33464737]
5506 [0.3203847 0.66875526 0.33444843]
5507 [0.32025866 0.66849827 0.33483394]
5508 [0.3200814 0.66845985 0.33454708]
5509 [0.3200024 0.6683193 0.33406322]
5510 [0.31996687 0.66806482 0.33440191]
5511 [0.31966448 0.66830273 0.33415246]]
5512 fxs: [0.00017198 0.00017327 0.00017655 0.0001803 0.00018098 0.00018176

```

```

5513 0.00019019]
5514 Centroid: [0.32011813 0.66846367 0.33444206]
5515 x_new: [[0.32057179 0.66862461 0.33473165]]
5516 fx_new [0.00016865]
5517 Expanding
5518
5519 xs: [[0.32102544 0.66878555 0.33502125]
5520 [0.32046843 0.66884545 0.33464737]
5521 [0.3203847 0.66875526 0.33444843]
5522 [0.32025866 0.66849827 0.33483394]
5523 [0.3200814 0.66845985 0.33454708]
5524 [0.3200024 0.6683193 0.33406322]
5525 [0.31996687 0.66806482 0.33440191]]
5526 fxs: [0.00015882 0.00017198 0.00017327 0.00017655 0.0001803 0.00018098
5527 0.00018176]
5528 Centroid: [0.32031256 0.66853264 0.33456617]
5529 x_new: [[0.32065824 0.66900047 0.33473043]]
5530 fx_new [0.00016806]
5531 Back to top
5532
5533 xs: [[0.32102544 0.66878555 0.33502125]
5534 [0.32065824 0.66900047 0.33473043]
5535 [0.32046843 0.66884545 0.33464737]
5536 [0.3203847 0.66875526 0.33444843]
5537 [0.32025866 0.66849827 0.33483394]
5538 [0.3200814 0.66845985 0.33454708]
5539 [0.3200024 0.6683193 0.33406322]]
5540 fxs: [0.00015882 0.00016806 0.00017198 0.00017327 0.00017655 0.0001803
5541 0.00018098]
5542 Centroid: [0.32041132 0.66866631 0.3346131 ]
5543 x_new: [[0.32082024 0.66901332 0.33516298]]
5544 fx_new [0.00016543]
5545 Back to top
5546
5547 xs: [[0.32102544 0.66878555 0.33502125]
5548 [0.32082024 0.66901332 0.33516298]
5549 [0.32065824 0.66900047 0.33473043]
5550 [0.32046843 0.66884545 0.33464737]
5551 [0.3203847 0.66875526 0.33444843]
5552 [0.32025866 0.66849827 0.33483394]
5553 [0.3200814 0.66845985 0.33454708]]
5554 fxs: [0.00015882 0.00016543 0.00016806 0.00017198 0.00017327 0.00017655
5555 0.0001803 ]
5556 Centroid: [0.32052816 0.66876545 0.33477021]
5557 x_new: [[0.32097492 0.66907106 0.33499334]]
5558 fx_new [0.00016127]
5559 Back to top
5560
5561 xs: [[0.32102544 0.66878555 0.33502125]
5562 [0.32097492 0.66907106 0.33499334]
5563 [0.32082024 0.66901332 0.33516298]
5564 [0.32065824 0.66900047 0.33473043]
5565 [0.32046843 0.66884545 0.33464737]
5566 [0.3203847 0.66875526 0.33444843]
5567 [0.32025866 0.66849827 0.33483394]]
5568 fxs: [0.00015882 0.00016127 0.00016543 0.00016806 0.00017198 0.00017327
5569 0.00017655]
5570 Centroid: [0.3206558 0.66885277 0.33483396]
5571 x_new: [[0.32105295 0.66920727 0.33483398]]
5572 fx_new [0.00015951]
5573 Back to top
5574
5575 xs: [[0.32102544 0.66878555 0.33502125]
5576 [0.32105295 0.66920727 0.33483398]
5577 [0.32097492 0.66907106 0.33499334]
5578 [0.32082024 0.66901332 0.33516298]
5579 [0.32065824 0.66900047 0.33473043]
5580 [0.32046843 0.66884545 0.33464737]
5581 [0.3203847 0.66875526 0.33444843]]
5582 fxs: [0.00015882 0.00015951 0.00016127 0.00016543 0.00016806 0.00017198

```



```

5583 0.00017327]
5584 Centroid: [0.32076927 0.66895406 0.33483397]
5585 x_new: [[0.32115385 0.66915285 0.33521951]]
5586 fx_new [0.00015808]
5587 Expanding
5588
5589 xs: [[0.32153843 0.66935164 0.33560505]
5590 [0.32102544 0.66878555 0.33502125]
5591 [0.32105295 0.66920727 0.33483398]
5592 [0.32097492 0.66907106 0.33499334]
5593 [0.32082024 0.66901332 0.33516298]
5594 [0.32065824 0.66900047 0.33473043]
5595 [0.32046843 0.66884545 0.33464737]]
5596 fxs: [0.00015149 0.00015882 0.00015951 0.00016127 0.00016543 0.00016806
5597 0.00017198]
5598 Centroid: [0.32093409 0.66903925 0.3349992 ]
5599 x_new: [[0.32139976 0.66923305 0.33535103]]
5600 fx_new [0.00015307]
5601 Back to top
5602
5603 xs: [[0.32153843 0.66935164 0.33560505]
5604 [0.32139976 0.66923305 0.33535103]
5605 [0.32102544 0.66878555 0.33502125]
5606 [0.32105295 0.66920727 0.33483398]
5607 [0.32097492 0.66907106 0.33499334]
5608 [0.32082024 0.66901332 0.33516298]
5609 [0.32065824 0.66900047 0.33473043]]
5610 fxs: [0.00015149 0.00015307 0.00015882 0.00015951 0.00016127 0.00016543
5611 0.00016806]
5612 Centroid: [0.32106714 0.66909462 0.33509972]
5613 x_new: [[0.32147604 0.66918878 0.33546902]]
5614 fx_new [0.00015152]
5615 Back to top
5616
5617 xs: [[0.32153843 0.66935164 0.33560505]
5618 [0.32147604 0.66918878 0.33546902]
5619 [0.32139976 0.66923305 0.33535103]
5620 [0.32102544 0.66878555 0.33502125]
5621 [0.32105295 0.66920727 0.33483398]
5622 [0.32097492 0.66907106 0.33499334]
5623 [0.32082024 0.66901332 0.33516298]]
5624 fxs: [0.00015149 0.00015152 0.00015307 0.00015882 0.00015951 0.00016127
5625 0.00016543]
5626 Centroid: [0.32118397 0.66912152 0.33520523]
5627 x_new: [[0.32154769 0.66922973 0.33524749]]
5628 fx_new [0.00014913]
5629 Expanding
5630
5631 xs: [[0.32191142 0.66933793 0.33528975]
5632 [0.32153843 0.66935164 0.33560505]
5633 [0.32147604 0.66918878 0.33546902]
5634 [0.32139976 0.66923305 0.33535103]
5635 [0.32102544 0.66878555 0.33502125]
5636 [0.32105295 0.66920727 0.33483398]
5637 [0.32097492 0.66907106 0.33499334]]
5638 fxs: [0.00014142 0.00015149 0.00015152 0.00015307 0.00015882 0.00015951
5639 0.00016127]
5640 Centroid: [0.32133985 0.6691679 0.33522334]
5641 x_new: [[0.32170478 0.66926474 0.33545335]]
5642 fx_new [0.00014647]
5643 Back to top
5644
5645 xs: [[0.32191142 0.66933793 0.33528975]
5646 [0.32170478 0.66926474 0.33545335]
5647 [0.32153843 0.66935164 0.33560505]
5648 [0.32147604 0.66918878 0.33546902]
5649 [0.32139976 0.66923305 0.33535103]
5650 [0.32102544 0.66878555 0.33502125]
5651 [0.32105295 0.66920727 0.33483398]]
5652 fxs: [0.00014142 0.00014647 0.00015149 0.00015152 0.00015307 0.00015882

```

```

5653 0.00015951]
5654 Centroid: [0.32144412 0.66919557 0.33528906]
5655 x_new: [[0.32183528 0.66918386 0.33574414]]
5656 fx_new [0.00014435]
5657 Back to top
5658
5659 xs: [[0.32191142 0.66933793 0.33528975]
5660 [0.32183528 0.66918386 0.33574414]
5661 [0.32170478 0.66926474 0.33545335]
5662 [0.32153843 0.66935164 0.33560505]
5663 [0.32147604 0.66918878 0.33546902]
5664 [0.32139976 0.66923305 0.33535103]
5665 [0.32102544 0.66878555 0.33502125]]
5666 fxs: [0.00014142 0.00014435 0.00014647 0.00015149 0.00015152 0.00015307
5667 0.00015882]
5668 Centroid: [0.32155588 0.66919222 0.33541908]
5669 x_new: [[0.32208632 0.66959889 0.33581692]]
5670 fx_new [0.00014126]
5671 Expanding
5672
5673 xs: [[0.32261676 0.67000556 0.33621475]
5674 [0.32191142 0.66933793 0.33528975]
5675 [0.32183528 0.66918386 0.33574414]
5676 [0.32170478 0.66926474 0.33545335]
5677 [0.32153843 0.66935164 0.33560505]
5678 [0.32147604 0.66918878 0.33546902]
5679 [0.32139976 0.66923305 0.33535103]]
5680 fxs: [0.0001343 0.00014142 0.00014435 0.00014647 0.00015149 0.00015152
5681 0.00015307]
5682 Centroid: [0.32178321 0.66936651 0.33558958]
5683 x_new: [[0.32216666 0.66949997 0.33582814]]
5684 fx_new [0.00013895]
5685 Back to top
5686
5687 xs: [[0.32261676 0.67000556 0.33621475]
5688 [0.32216666 0.66949997 0.33582814]
5689 [0.32191142 0.66933793 0.33528975]
5690 [0.32183528 0.66918386 0.33574414]
5691 [0.32170478 0.66926474 0.33545335]
5692 [0.32153843 0.66935164 0.33560505]
5693 [0.32147604 0.66918878 0.33546902]]
5694 fxs: [0.0001343 0.00013895 0.00014142 0.00014435 0.00014647 0.00015149
5695 0.00015152]
5696 Centroid: [0.32189277 0.66940464 0.33565774]
5697 x_new: [[0.32230949 0.6696205 0.33584647]]
5698 fx_new [0.00013657]
5699 Back to top
5700
5701 xs: [[0.32261676 0.67000556 0.33621475]
5702 [0.32230949 0.6696205 0.33584647]
5703 [0.32216666 0.66949997 0.33582814]
5704 [0.32191142 0.66933793 0.33528975]
5705 [0.32183528 0.66918386 0.33574414]
5706 [0.32170478 0.66926474 0.33545335]
5707 [0.32153843 0.66935164 0.33560505]]
5708 fxs: [0.0001343 0.00013657 0.00013895 0.00014142 0.00014435 0.00014647
5709 0.00015149]
5710 Centroid: [0.32201183 0.66946632 0.33571166]
5711 x_new: [[0.32248523 0.66958099 0.33581828]]
5712 fx_new [0.00013235]
5713 Expanding
5714
5715 xs: [[0.32295863 0.66969566 0.33592489]
5716 [0.32261676 0.67000556 0.33621475]
5717 [0.32230949 0.6696205 0.33584647]
5718 [0.32216666 0.66949997 0.33582814]
5719 [0.32191142 0.66933793 0.33528975]
5720 [0.32183528 0.66918386 0.33574414]
5721 [0.32170478 0.66926474 0.33545335]]
5722 fxs: [0.00012353 0.0001343 0.00013657 0.00013895 0.00014142 0.00014435

```

```

5723 0.00014647]
5724 Centroid: [0.32221472 0.66951546 0.33575735]
5725 x_new: [[0.32272465 0.66976618 0.33606136]]
5726 fx_new [0.00012959]
5727 Back to top
5728
5729 xs: [[0.32295863 0.66969566 0.33592489]
5730 [0.32272465 0.66976618 0.33606136]
5731 [0.32261676 0.67000556 0.33621475]
5732 [0.32230949 0.6696205 0.33584647]
5733 [0.32216666 0.66949997 0.33582814]
5734 [0.32191142 0.66933793 0.33528975]
5735 [0.32183528 0.66918386 0.33574414]]
5736 fxs: [0.00012353 0.00012959 0.0001343 0.00013657 0.00013895 0.00014142
5737 0.00014435]
5738 Centroid: [0.32236041 0.6695871 0.33584421]
5739 x_new: [[0.32288554 0.66999033 0.33594429]]
5740 fx_new [0.00012702]
5741 Back to top
5742
5743 xs: [[0.32295863 0.66969566 0.33592489]
5744 [0.32288554 0.66999033 0.33594429]
5745 [0.32272465 0.66976618 0.33606136]
5746 [0.32261676 0.67000556 0.33621475]
5747 [0.32230949 0.6696205 0.33584647]
5748 [0.32216666 0.66949997 0.33582814]
5749 [0.32191142 0.66933793 0.33528975]]
5750 fxs: [0.00012353 0.00012702 0.00012959 0.0001343 0.00013657 0.00013895
5751 0.00014142]
5752 Centroid: [0.32251045 0.66970231 0.33587281]
5753 x_new: [[0.32310949 0.67006668 0.33645587]]
5754 fx_new [0.00012584]
5755 Back to top
5756
5757 xs: [[0.32295863 0.66969566 0.33592489]
5758 [0.32310949 0.67006668 0.33645587]
5759 [0.32288554 0.66999033 0.33594429]
5760 [0.32272465 0.66976618 0.33606136]
5761 [0.32261676 0.67000556 0.33621475]
5762 [0.32230949 0.6696205 0.33584647]
5763 [0.32216666 0.66949997 0.33582814]]
5764 fxs: [0.00012353 0.00012584 0.00012702 0.00012959 0.0001343 0.00013657
5765 0.00013895]
5766 Centroid: [0.3226816 0.66980641 0.33603939]
5767 x_new: [[0.32319655 0.67011286 0.33625065]]
5768 fx_new [0.00012314]
5769 Expanding
5770
5771 xs: [[0.32371149 0.6704193 0.33646191]
5772 [0.32295863 0.66969566 0.33592489]
5773 [0.32310949 0.67006668 0.33645587]
5774 [0.32288554 0.66999033 0.33594429]
5775 [0.32272465 0.66976618 0.33606136]
5776 [0.32261676 0.67000556 0.33621475]
5777 [0.32230949 0.6696205 0.33584647]]
5778 fxs: [0.00011645 0.00012353 0.00012584 0.00012702 0.00012959 0.0001343
5779 0.00013657]
5780 Centroid: [0.32290229 0.66993775 0.33612993]
5781 x_new: [[0.32349509 0.67025499 0.3364134 ]]
5782 fx_new [0.00011915]
5783 Back to top
5784
5785 xs: [[0.32371149 0.6704193 0.33646191]
5786 [0.32349509 0.67025499 0.3364134 ]
5787 [0.32295863 0.66969566 0.33592489]
5788 [0.32310949 0.67006668 0.33645587]
5789 [0.32288554 0.66999033 0.33594429]
5790 [0.32272465 0.66976618 0.33606136]
5791 [0.32261676 0.67000556 0.33621475]]
5792 fxs: [0.00011645 0.00011915 0.00012353 0.00012584 0.00012702 0.00012959

```

```

5793 0.0001343 ]
5794 Centroid: [0.32307167 0.67002839 0.33621092]
5795 x_new: [[0.32352658 0.67005121 0.3362071 ]]
5796 fx_new [0.00011589]
5797 Expanding
5798
5799 xs: [[0.32398149 0.67007404 0.33620327]
5800 [0.32371149 0.6704193 0.33646191]
5801 [0.32349509 0.67025499 0.3364134 ]
5802 [0.32295863 0.66969566 0.33592489]
5803 [0.32310949 0.67006668 0.33645587]
5804 [0.32288554 0.66999033 0.33594429]
5805 [0.32272465 0.66976618 0.33606136]]
5806 fxs: [0.0001073 0.00011645 0.00011915 0.00012353 0.00012584 0.00012702
5807 0.00012959]
5808 Centroid: [0.32326663 0.67003817 0.33620928]
5809 x_new: [[0.3238086 0.67031015 0.33635721]]
5810 fx_new [0.00011314]
5811 Back to top
5812
5813 xs: [[0.32398149 0.67007404 0.33620327]
5814 [0.3238086 0.67031015 0.33635721]
5815 [0.32371149 0.6704193 0.33646191]
5816 [0.32349509 0.67025499 0.3364134 ]
5817 [0.32295863 0.66969566 0.33592489]
5818 [0.32310949 0.67006668 0.33645587]
5819 [0.32288554 0.66999033 0.33594429]]
5820 fxs: [0.0001073 0.00011314 0.00011645 0.00011915 0.00012353 0.00012584
5821 0.00012702]
5822 Centroid: [0.32342148 0.67011588 0.33625155]
5823 x_new: [[0.32395741 0.67024143 0.33655881]]
5824 fx_new [0.00011109]
5825 Back to top
5826
5827 xs: [[0.32398149 0.67007404 0.33620327]
5828 [0.32395741 0.67024143 0.33655881]
5829 [0.3238086 0.67031015 0.33635721]
5830 [0.32371149 0.6704193 0.33646191]
5831 [0.32349509 0.67025499 0.3364134 ]
5832 [0.32295863 0.66969566 0.33592489]
5833 [0.32310949 0.67006668 0.33645587]]
5834 fxs: [0.0001073 0.00011109 0.00011314 0.00011645 0.00011915 0.00012353
5835 0.00012584]
5836 Centroid: [0.3235746 0.67015175 0.33633934]
5837 x_new: [[0.32403971 0.67023682 0.33622281]]
5838 fx_new [0.00010747]
5839 Back to top
5840
5841 xs: [[0.32398149 0.67007404 0.33620327]
5842 [0.32403971 0.67023682 0.33622281]
5843 [0.32395741 0.67024143 0.33655881]
5844 [0.3238086 0.67031015 0.33635721]
5845 [0.32371149 0.6704193 0.33646191]
5846 [0.32349509 0.67025499 0.3364134 ]
5847 [0.32295863 0.66969566 0.33592489]]
5848 fxs: [0.0001073 0.00010747 0.00011109 0.00011314 0.00011645 0.00011915
5849 0.00012353]
5850 Centroid: [0.32370749 0.67017605 0.33630604]
5851 x_new: [[0.32445635 0.67065645 0.33668719]]
5852 fx_new [0.00010597]
5853 Expanding
5854
5855 xs: [[0.3252052 0.67113684 0.33706834]
5856 [0.32398149 0.67007404 0.33620327]
5857 [0.32403971 0.67023682 0.33622281]
5858 [0.32395741 0.67024143 0.33655881]
5859 [0.3238086 0.67031015 0.33635721]
5860 [0.32371149 0.6704193 0.33646191]
5861 [0.32349509 0.67025499 0.3364134 ]]
5862 fxs: [9.99992473e-05 1.07303710e-04 1.07466390e-04 1.11090530e-04

```

```

5863 | 1.13139326e-04 1.16450090e-04 1.19153811e-04]
5864 | Centroid: [0.32402843 0.67038194 0.33646939]
5865 | x_new: [[0.32456176 0.67050889 0.33652538]]
5866 | fx_new [0.00010189]
5867 | Back to top
5868 | _____
5869 | xs: [[0.3252052 0.67113684 0.33706834]
5870 | [0.32456176 0.67050889 0.33652538]
5871 | [0.32398149 0.67007404 0.33620327]
5872 | [0.32403971 0.67023682 0.33622281]
5873 | [0.32395741 0.67024143 0.33655881]
5874 | [0.3238086 0.67031015 0.33635721]
5875 | [0.32371149 0.6704193 0.33646191]]
5876 | fxs: [9.99992473e-05 1.01892273e-04 1.07303710e-04 1.07466390e-04
5877 | 1.11090530e-04 1.13139326e-04 1.16450090e-04]
5878 | Centroid: [0.32418081 0.67041821 0.33648539]
5879 | x_new: [[0.32465013 0.67041712 0.33650887]]
5880 | fx_new [9.95479386e-05]
5881 | Expanding
5882 | _____
5883 | xs: [[0.32511945 0.67041602 0.33653234]
5884 | [0.3252052 0.67113684 0.33706834]
5885 | [0.32456176 0.67050889 0.33652538]
5886 | [0.32398149 0.67007404 0.33620327]
5887 | [0.32403971 0.67023682 0.33622281]
5888 | [0.32395741 0.67024143 0.33655881]
5889 | [0.3238086 0.67031015 0.33635721]]
5890 | fxs: [9.17592974e-05 9.99992473e-05 1.01892273e-04 1.07303710e-04
5891 | 1.07466390e-04 1.11090530e-04 1.13139326e-04]
5892 | Centroid: [0.32438195 0.67041774 0.33649545]
5893 | x_new: [[0.32495529 0.67052533 0.33663369]]
5894 | fx_new [9.59732389e-05]
5895 | Back to top
5896 | _____
5897 | xs: [[0.32511945 0.67041602 0.33653234]
5898 | [0.32495529 0.67052533 0.33663369]
5899 | [0.3252052 0.67113684 0.33706834]
5900 | [0.32456176 0.67050889 0.33652538]
5901 | [0.32398149 0.67007404 0.33620327]
5902 | [0.32403971 0.67023682 0.33622281]
5903 | [0.32395741 0.67024143 0.33655881]]
5904 | fxs: [9.17592974e-05 9.59732389e-05 9.99992473e-05 1.01892273e-04
5905 | 1.07303710e-04 1.07466390e-04 1.11090530e-04]
5906 | Centroid: [0.32454576 0.67044848 0.33653495]
5907 | x_new: [[0.32513411 0.67065554 0.33651109]]
5908 | fx_new [9.32364886e-05]
5909 | Back to top
5910 | _____
5911 | xs: [[0.32511945 0.67041602 0.33653234]
5912 | [0.32513411 0.67065554 0.33651109]
5913 | [0.32495529 0.67052533 0.33663369]
5914 | [0.3252052 0.67113684 0.33706834]
5915 | [0.32456176 0.67050889 0.33652538]
5916 | [0.32398149 0.67007404 0.33620327]
5917 | [0.32403971 0.67023682 0.33622281]]
5918 | fxs: [9.17592974e-05 9.32364886e-05 9.59732389e-05 9.99992473e-05
5919 | 1.01892273e-04 1.07303710e-04 1.07466390e-04]
5920 | Centroid: [0.32471386 0.67050764 0.33652813]
5921 | x_new: [[0.325388 0.67077846 0.33683346]]
5922 | fx_new [9.22859643e-05]
5923 | Back to top
5924 | _____
5925 | xs: [[0.32511945 0.67041602 0.33653234]
5926 | [0.325388 0.67077846 0.33683346]
5927 | [0.32513411 0.67065554 0.33651109]
5928 | [0.32495529 0.67052533 0.33663369]
5929 | [0.3252052 0.67113684 0.33706834]
5930 | [0.32456176 0.67050889 0.33652538]
5931 | [0.32398149 0.67007404 0.33620327]]
5932 | fxs: [9.17592974e-05 9.22859643e-05 9.32364886e-05 9.59732389e-05

```

```

5933 9.99992473e-05 1.01892273e-04 1.07303710e-04]
5934 Centroid: [0.32490647 0.67058502 0.33661537]
5935 x_new: [[0.32583146 0.671096 0.33702747]]
5936 fx_new [8.95437514e-05]
5937 Expanding
5938
5939 xs: [[0.32675644 0.67160698 0.33743957]
5940 [0.32511945 0.67041602 0.33653234]
5941 [0.325388 0.67077846 0.33683346]
5942 [0.32513411 0.67065554 0.33651109]
5943 [0.32495529 0.67052533 0.33663369]
5944 [0.3252052 0.67113684 0.33706834]
5945 [0.32456176 0.67050889 0.33652538]]
5946 fxs: [8.45233536e-05 9.17592974e-05 9.22859643e-05 9.32364886e-05
5947 9.59732389e-05 9.99992473e-05 1.01892273e-04]
5948 Centroid: [0.32530289 0.67080401 0.33679198]
5949 x_new: [[0.32604403 0.67109913 0.33705858]]
5950 fx_new [8.66582209e-05]
5951 Back to top
5952
5953 xs: [[0.32675644 0.67160698 0.33743957]
5954 [0.32604403 0.67109913 0.33705858]
5955 [0.32511945 0.67041602 0.33653234]
5956 [0.325388 0.67077846 0.33683346]
5957 [0.32513411 0.67065554 0.33651109]
5958 [0.32495529 0.67052533 0.33663369]
5959 [0.3252052 0.67113684 0.33706834]]
5960 fxs: [8.45233536e-05 8.66582209e-05 9.17592974e-05 9.22859643e-05
5961 9.32364886e-05 9.59732389e-05 9.99992473e-05]
5962 Centroid: [0.32551465 0.67088833 0.33686815]
5963 x_new: [[0.32582409 0.67063982 0.33666797]]
5964 fx_new [8.32944434e-05]
5965 Expanding
5966
5967 xs: [[0.32613353 0.6703913 0.33646778]
5968 [0.32675644 0.67160698 0.33743957]
5969 [0.32604403 0.67109913 0.33705858]
5970 [0.32511945 0.67041602 0.33653234]
5971 [0.325388 0.67077846 0.33683346]
5972 [0.32513411 0.67065554 0.33651109]
5973 [0.32495529 0.67052533 0.33663369]]
5974 fxs: [7.55348076e-05 8.45233536e-05 8.66582209e-05 9.17592974e-05
5975 9.22859643e-05 9.32364886e-05 9.59732389e-05]
5976 Centroid: [0.32564726 0.67078182 0.33678236]
5977 x_new: [[0.32633924 0.67103832 0.33693103]]
5978 fx_new [8.09720881e-05]
5979 Back to top
5980
5981 xs: [[0.32613353 0.6703913 0.33646778]
5982 [0.32633924 0.67103832 0.33693103]
5983 [0.32675644 0.67160698 0.33743957]
5984 [0.32604403 0.67109913 0.33705858]
5985 [0.32511945 0.67041602 0.33653234]
5986 [0.325388 0.67077846 0.33683346]
5987 [0.32513411 0.67065554 0.33651109]]
5988 fxs: [7.55348076e-05 8.09720881e-05 8.45233536e-05 8.66582209e-05
5989 9.17592974e-05 9.22859643e-05 9.32364886e-05]
5990 Centroid: [0.32584497 0.67085511 0.33682483]
5991 x_new: [[0.32655583 0.67105468 0.33713858]]
5992 fx_new [7.96690645e-05]
5993 Back to top
5994
5995 xs: [[0.32613353 0.6703913 0.33646778]
5996 [0.32655583 0.67105468 0.33713858]
5997 [0.32633924 0.67103832 0.33693103]
5998 [0.32675644 0.67160698 0.33743957]
5999 [0.32604403 0.67109913 0.33705858]
6000 [0.32511945 0.67041602 0.33653234]
6001 [0.325388 0.67077846 0.33683346]]
6002 fxs: [7.55348076e-05 7.96690645e-05 8.09720881e-05 8.45233536e-05

```

```

6003 8.66582209e-05 9.17592974e-05 9.22859643e-05]
6004 Centroid: [0.32604807 0.67091213 0.33691448]
6005 x_new: [[0.32670814 0.67104579 0.3369955 ]]
6006 fx_new [7.64813281e-05]
6007 Back to top
6008
6009 xs: [[0.32613353 0.6703913 0.33646778]
6010 [0.32670814 0.67104579 0.3369955 ]
6011 [0.32655583 0.67105468 0.33713858]
6012 [0.32633924 0.67103832 0.33693103]
6013 [0.32675644 0.67160698 0.33743957]
6014 [0.32604403 0.67109913 0.33705858]
6015 [0.32511945 0.67041602 0.33653234]]
6016 fxs: [7.55348076e-05 7.64813281e-05 7.96690645e-05 8.09720881e-05
6017 8.45233536e-05 8.66582209e-05 9.17592974e-05]
6018 Centroid: [0.32623667 0.67095032 0.33693762]
6019 x_new: [[0.32735389 0.67148461 0.33734291]]
6020 fx_new [7.50430657e-05]
6021 Expanding
6022
6023 xs: [[0.3284711 0.6720189 0.33774819]
6024 [0.32613353 0.6703913 0.33646778]
6025 [0.32670814 0.67104579 0.3369955 ]
6026 [0.32655583 0.67105468 0.33713858]
6027 [0.32633924 0.67103832 0.33693103]
6028 [0.32675644 0.67160698 0.33743957]
6029 [0.32604403 0.67109913 0.33705858]]
6030 fxs: [7.17786580e-05 7.55348076e-05 7.64813281e-05 7.96690645e-05
6031 8.09720881e-05 8.45233536e-05 8.66582209e-05]
6032 Centroid: [0.32671547 0.6711793 0.33711132]
6033 x_new: [[0.32738692 0.67125947 0.33716405]]
6034 fx_new [7.11280585e-05]
6035 Expanding
6036
6037 xs: [[0.32805837 0.67133964 0.33721679]
6038 [0.3284711 0.6720189 0.33774819]
6039 [0.32613353 0.6703913 0.33646778]
6040 [0.32670814 0.67104579 0.3369955 ]
6041 [0.32655583 0.67105468 0.33713858]
6042 [0.32633924 0.67103832 0.33693103]
6043 [0.32675644 0.67160698 0.33743957]]
6044 fxs: [6.47431296e-05 7.17786580e-05 7.55348076e-05 7.64813281e-05
6045 7.96690645e-05 8.09720881e-05 8.45233536e-05]
6046 Centroid: [0.32700324 0.67121366 0.33713392]
6047 x_new: [[0.32725003 0.67082034 0.33682827]]
6048 fx_new [6.64741016e-05]
6049 Back to top
6050
6051 xs: [[0.32805837 0.67133964 0.33721679]
6052 [0.32725003 0.67082034 0.33682827]
6053 [0.3284711 0.6720189 0.33774819]
6054 [0.32613353 0.6703913 0.33646778]
6055 [0.32670814 0.67104579 0.3369955 ]
6056 [0.32655583 0.67105468 0.33713858]
6057 [0.32633924 0.67103832 0.33693103]]
6058 fxs: [6.47431296e-05 6.64741016e-05 7.17786580e-05 7.55348076e-05
6059 7.64813281e-05 7.96690645e-05 8.09720881e-05]
6060 Centroid: [0.32707375 0.67110128 0.33704659]
6061 x_new: [[0.32780826 0.67116425 0.33716215]]
6062 fx_new [6.54144875e-05]
6063 Back to top
6064
6065 xs: [[0.32805837 0.67133964 0.33721679]
6066 [0.32780826 0.67116425 0.33716215]
6067 [0.32725003 0.67082034 0.33682827]
6068 [0.3284711 0.6720189 0.33774819]
6069 [0.32613353 0.6703913 0.33646778]
6070 [0.32670814 0.67104579 0.3369955 ]
6071 [0.32655583 0.67105468 0.33713858]]
6072 fxs: [6.47431296e-05 6.54144875e-05 6.64741016e-05 7.17786580e-05

```

```

6073 7.55348076e-05 7.64813281e-05 7.96690645e-05]
6074 Centroid: [0.32728361 0.67111927 0.33707961]
6075 x_new: [[0.32801139 0.67118387 0.33702063]]
6076 fx_new [6.23243597e-05]
6077 Expanding
6078
6079 xs: [[0.32873917 0.67124846 0.33696166]
6080 [0.32805837 0.67133964 0.33721679]
6081 [0.32780826 0.67116425 0.33716215]
6082 [0.32725003 0.67082034 0.33682827]
6083 [0.3284711 0.6720189 0.33774819]
6084 [0.32613353 0.6703913 0.33646778]
6085 [0.32670814 0.67104579 0.3369955 ]]
6086 fxs: [5.52639447e-05 6.47431296e-05 6.54144875e-05 6.64741016e-05
6087 7.17786580e-05 7.55348076e-05 7.64813281e-05]
6088 Centroid: [0.32759552 0.67114696 0.33705433]
6089 x_new: [[0.32848289 0.67124812 0.33711317]]
6090 fx_new [5.88036565e-05]
6091 Back to top
6092
6093 xs: [[0.32873917 0.67124846 0.33696166]
6094 [0.32848289 0.67124812 0.33711317]
6095 [0.32805837 0.67133964 0.33721679]
6096 [0.32780826 0.67116425 0.33716215]
6097 [0.32725003 0.67082034 0.33682827]
6098 [0.3284711 0.6720189 0.33774819]
6099 [0.32613353 0.6703913 0.33646778]]
6100 fxs: [5.52639447e-05 5.88036565e-05 6.47431296e-05 6.54144875e-05
6101 6.64741016e-05 7.17786580e-05 7.55348076e-05]
6102 Centroid: [0.32784905 0.67117586 0.33707114]
6103 x_new: [[0.32956457 0.67196042 0.33767451]]
6104 fx_new [6.10731376e-05]
6105 Back to top
6106
6107 xs: [[0.32873917 0.67124846 0.33696166]
6108 [0.32848289 0.67124812 0.33711317]
6109 [0.32956457 0.67196042 0.33767451]
6110 [0.32805837 0.67133964 0.33721679]
6111 [0.32780826 0.67116425 0.33716215]
6112 [0.32725003 0.67082034 0.33682827]
6113 [0.3284711 0.6720189 0.33774819]]
6114 fxs: [5.52639447e-05 5.88036565e-05 6.10731376e-05 6.47431296e-05
6115 6.54144875e-05 6.64741016e-05 7.17786580e-05]
6116 Centroid: [0.3283392 0.67140002 0.33724353]
6117 x_new: [[0.32820729 0.67078113 0.33673888]]
6118 fx_new [5.48028194e-05]
6119 Expanding
6120
6121 xs: [[0.32807539 0.67016225 0.33623422]
6122 [0.32873917 0.67124846 0.33696166]
6123 [0.32848289 0.67124812 0.33711317]
6124 [0.32956457 0.67196042 0.33767451]
6125 [0.32805837 0.67133964 0.33721679]
6126 [0.32780826 0.67116425 0.33716215]
6127 [0.32725003 0.67082034 0.33682827]]
6128 fxs: [4.82801903e-05 5.52639447e-05 5.88036565e-05 6.10731376e-05
6129 6.47431296e-05 6.54144875e-05 6.64741016e-05]
6130 Centroid: [0.32828267 0.67113478 0.33702725]
6131 x_new: [[0.32931531 0.67144922 0.33722624]]
6132 fx_new [5.41720894e-05]
6133 Back to top
6134
6135 xs: [[0.32807539 0.67016225 0.33623422]
6136 [0.32931531 0.67144922 0.33722624]
6137 [0.32873917 0.67124846 0.33696166]
6138 [0.32848289 0.67124812 0.33711317]
6139 [0.32956457 0.67196042 0.33767451]
6140 [0.32805837 0.67133964 0.33721679]
6141 [0.32780826 0.67116425 0.33716215]]
6142 fxs: [4.82801903e-05 5.41720894e-05 5.52639447e-05 5.88036565e-05

```



```

6143 6.10731376e-05 6.47431296e-05 6.54144875e-05]
6144 Centroid: [0.32857771 0.67122462 0.3370841 ]
6145 x_new: [[0.32934715 0.671285 0.33700606]]
6146 fx_new [5.07074923e-05]
6147 Back to top
6148
6149 xs: [[0.32807539 0.67016225 0.33623422]
6150 [0.32934715 0.671285 0.33700606]
6151 [0.32931531 0.67144922 0.33722624]
6152 [0.32873917 0.67124846 0.33696166]
6153 [0.32848289 0.67124812 0.33711317]
6154 [0.32956457 0.67196042 0.33767451]
6155 [0.32805837 0.67133964 0.33721679]]
6156 fxs: [4.82801903e-05 5.07074923e-05 5.41720894e-05 5.52639447e-05
6157 5.88036565e-05 6.10731376e-05 6.47431296e-05]
6158 Centroid: [0.32879755 0.67124187 0.33706181]
6159 x_new: [[0.32953673 0.6711441 0.33690682]]
6160 fx_new [4.72314662e-05]
6161 Expanding
6162
6163 xs: [[0.33027591 0.67104633 0.33675184]
6164 [0.32807539 0.67016225 0.33623422]
6165 [0.32934715 0.671285 0.33700606]
6166 [0.32931531 0.67144922 0.33722624]
6167 [0.32873917 0.67124846 0.33696166]
6168 [0.32848289 0.67124812 0.33711317]
6169 [0.32956457 0.67196042 0.33767451]]
6170 fxs: [4.02155280e-05 4.82801903e-05 5.07074923e-05 5.41720894e-05
6171 5.52639447e-05 5.88036565e-05 6.10731376e-05]
6172 Centroid: [0.32911434 0.67119997 0.33699539]
6173 x_new: [[0.32866411 0.67043952 0.33631626]]
6174 fx_new [4.49339635e-05]
6175 Back to top
6176
6177 xs: [[0.33027591 0.67104633 0.33675184]
6178 [0.32866411 0.67043952 0.33631626]
6179 [0.32807539 0.67016225 0.33623422]
6180 [0.32934715 0.671285 0.33700606]
6181 [0.32931531 0.67144922 0.33722624]
6182 [0.32873917 0.67124846 0.33696166]
6183 [0.32848289 0.67124812 0.33711317]]
6184 fxs: [4.02155280e-05 4.49339635e-05 4.82801903e-05 5.07074923e-05
6185 5.41720894e-05 5.52639447e-05 5.88036565e-05]
6186 Centroid: [0.3289857 0.6709827 0.33680135]
6187 x_new: [[0.32948852 0.67071728 0.33648953]]
6188 fx_new [4.11516748e-05]
6189 Back to top
6190
6191 xs: [[0.33027591 0.67104633 0.33675184]
6192 [0.32948852 0.67071728 0.33648953]
6193 [0.32866411 0.67043952 0.33631626]
6194 [0.32807539 0.67016225 0.33623422]
6195 [0.32934715 0.671285 0.33700606]
6196 [0.32931531 0.67144922 0.33722624]
6197 [0.32873917 0.67124846 0.33696166]]
6198 fxs: [4.02155280e-05 4.11516748e-05 4.49339635e-05 4.82801903e-05
6199 5.07074923e-05 5.41720894e-05 5.52639447e-05]
6200 Centroid: [0.32912937 0.67090687 0.33671226]
6201 x_new: [[0.32951956 0.67056527 0.33646286]]
6202 fx_new [3.95378983e-05]
6203 Expanding
6204
6205 xs: [[0.32990976 0.67022368 0.33621346]
6206 [0.33027591 0.67104633 0.33675184]
6207 [0.32948852 0.67071728 0.33648953]
6208 [0.32866411 0.67043952 0.33631626]
6209 [0.32807539 0.67016225 0.33623422]
6210 [0.32934715 0.671285 0.33700606]
6211 [0.32931531 0.67144922 0.33722624]]
6212 fxs: [3.26682987e-05 4.02155280e-05 4.11516748e-05 4.49339635e-05

```

```

6213 4.82801903e-05 5.07074923e-05 5.41720894e-05]
6214 Centroid: [0.32929659 0.67076047 0.33660537]
6215 x_new: [[0.32927788 0.67007171 0.33598451]]
6216 fx_new [3.50697921e-05]
6217 Back to top
6218
6219 xs: [[0.32990976 0.67022368 0.33621346]
6220 [0.32927788 0.67007171 0.33598451]
6221 [0.33027591 0.67104633 0.33675184]
6222 [0.32948852 0.67071728 0.33648953]
6223 [0.32866411 0.67043952 0.33631626]
6224 [0.32807539 0.67016225 0.33623422]
6225 [0.32934715 0.671285 0.33700606]]
6226 fxs: [3.26682987e-05 3.50697921e-05 4.02155280e-05 4.11516748e-05
6227 4.49339635e-05 4.82801903e-05 5.07074923e-05]
6228 Centroid: [0.32929125 0.67056368 0.33642798]
6229 x_new: [[0.32923534 0.66984237 0.33584991]]
6230 fx_new [3.32117985e-05]
6231 Back to top
6232
6233 xs: [[0.32990976 0.67022368 0.33621346]
6234 [0.32923534 0.66984237 0.33584991]
6235 [0.32927788 0.67007171 0.33598451]
6236 [0.33027591 0.67104633 0.33675184]
6237 [0.32948852 0.67071728 0.33648953]
6238 [0.32866411 0.67043952 0.33631626]
6239 [0.32807539 0.67016225 0.33623422]]
6240 fxs: [3.26682987e-05 3.32117985e-05 3.50697921e-05 4.02155280e-05
6241 4.11516748e-05 4.49339635e-05 4.82801903e-05]
6242 Centroid: [0.32927527 0.67035759 0.33626282]
6243 x_new: [[0.33047515 0.67055294 0.33629142]]
6244 fx_new [3.20225578e-05]
6245 Expanding
6246
6247 xs: [[0.33167504 0.67074828 0.33632002]
6248 [0.32990976 0.67022368 0.33621346]
6249 [0.32923534 0.66984237 0.33584991]
6250 [0.32927788 0.67007171 0.33598451]
6251 [0.33027591 0.67104633 0.33675184]
6252 [0.32948852 0.67071728 0.33648953]
6253 [0.32866411 0.67043952 0.33631626]]
6254 fxs: [2.83298273e-05 3.26682987e-05 3.32117985e-05 3.50697921e-05
6255 4.02155280e-05 4.11516748e-05 4.49339635e-05]
6256 Centroid: [0.32978951 0.67044131 0.33627508]
6257 x_new: [[0.3309149 0.6704431 0.33623389]]
6258 fx_new [2.8523465e-05]
6259 Back to top
6260
6261 xs: [[0.33167504 0.67074828 0.33632002]
6262 [0.3309149 0.6704431 0.33623389]
6263 [0.32990976 0.67022368 0.33621346]
6264 [0.32923534 0.66984237 0.33584991]
6265 [0.32927788 0.67007171 0.33598451]
6266 [0.33027591 0.67104633 0.33675184]
6267 [0.32948852 0.67071728 0.33648953]]
6268 fxs: [2.83298273e-05 2.85234650e-05 3.26682987e-05 3.32117985e-05
6269 3.50697921e-05 4.02155280e-05 4.11516748e-05]
6270 Centroid: [0.33011105 0.67044182 0.33626331]
6271 x_new: [[0.33073358 0.67016636 0.33603708]]
6272 fx_new [2.631686e-05]
6273 Expanding
6274
6275 xs: [[0.33135611 0.6698909 0.33581086]
6276 [0.33167504 0.67074828 0.33632002]
6277 [0.3309149 0.6704431 0.33623389]
6278 [0.32990976 0.67022368 0.33621346]
6279 [0.32923534 0.66984237 0.33584991]
6280 [0.32927788 0.67007171 0.33598451]
6281 [0.33027591 0.67104633 0.33675184]]
6282 fxs: [2.04432496e-05 2.83298273e-05 2.85234650e-05 3.26682987e-05

```

```

6283 3.32117985e-05 3.50697921e-05 4.02155280e-05]
6284 Centroid: [0.33037785 0.67032377 0.33616635]
6285 x_new: [[0.33047979 0.6696012 0.33558086]]
6286 fx_new [2.18056436e-05]
6287 Back to top
6288
6289 xs: [[0.33135611 0.6698909 0.33581086]
6290 [0.33047979 0.6696012 0.33558086]
6291 [0.33167504 0.67074828 0.33632002]
6292 [0.3309149 0.6704431 0.33623389]
6293 [0.32990976 0.67022368 0.33621346]
6294 [0.32923534 0.66984237 0.33584991]
6295 [0.32927788 0.67007171 0.33598451]]
6296 fxs: [2.04432496e-05 2.18056436e-05 2.83298273e-05 2.85234650e-05
6297 3.26682987e-05 3.32117985e-05 3.50697921e-05]
6298 Centroid: [0.33040697 0.67011732 0.33599907]
6299 x_new: [[0.33153607 0.67016293 0.33601364]]
6300 fx_new [2.26380325e-05]
6301 Back to top
6302
6303 xs: [[0.33135611 0.6698909 0.33581086]
6304 [0.33047979 0.6696012 0.33558086]
6305 [0.33153607 0.67016293 0.33601364]
6306 [0.33167504 0.67074828 0.33632002]
6307 [0.3309149 0.6704431 0.33623389]
6308 [0.32990976 0.67022368 0.33621346]
6309 [0.32923534 0.66984237 0.33584991]]
6310 fxs: [2.04432496e-05 2.18056436e-05 2.26380325e-05 2.83298273e-05
6311 2.85234650e-05 3.26682987e-05 3.32117985e-05]
6312 Centroid: [0.33072957 0.67013035 0.33600323]
6313 x_new: [[0.3322238 0.67041834 0.33615656]]
6314 fx_new [2.32766693e-05]
6315 Back to top
6316
6317 xs: [[0.33135611 0.6698909 0.33581086]
6318 [0.33047979 0.6696012 0.33558086]
6319 [0.33153607 0.67016293 0.33601364]
6320 [0.3322238 0.67041834 0.33615656]
6321 [0.33167504 0.67074828 0.33632002]
6322 [0.3309149 0.6704431 0.33623389]
6323 [0.32990976 0.67022368 0.33621346]]
6324 fxs: [2.04432496e-05 2.18056436e-05 2.26380325e-05 2.32766693e-05
6325 2.83298273e-05 2.85234650e-05 3.26682987e-05]
6326 Centroid: [0.33115649 0.67021263 0.33604704]
6327 x_new: [[0.33240323 0.67020159 0.33588062]]
6328 fx_new [1.98494505e-05]
6329 Expanding
6330
6331 xs: [[0.33364997 0.67019054 0.33571421]
6332 [0.33135611 0.6698909 0.33581086]
6333 [0.33047979 0.6696012 0.33558086]
6334 [0.33153607 0.67016293 0.33601364]
6335 [0.3322238 0.67041834 0.33615656]
6336 [0.33167504 0.67074828 0.33632002]
6337 [0.3309149 0.6704431 0.33623389]]
6338 fxs: [1.81865307e-05 2.04432496e-05 2.18056436e-05 2.26380325e-05
6339 2.32766693e-05 2.83298273e-05 2.85234650e-05]
6340 Centroid: [0.33169081 0.6702079 0.33597572]
6341 x_new: [[0.33246672 0.6699727 0.33571755]]
6342 fx_new [1.73653644e-05]
6343 Expanding
6344
6345 xs: [[0.33324262 0.6697375 0.33545938]
6346 [0.33364997 0.67019054 0.33571421]
6347 [0.33135611 0.6698909 0.33581086]
6348 [0.33047979 0.6696012 0.33558086]
6349 [0.33153607 0.67016293 0.33601364]
6350 [0.3322238 0.67041834 0.33615656]
6351 [0.33167504 0.67074828 0.33632002]]
6352 fxs: [1.39583200e-05 1.81865307e-05 2.04432496e-05 2.18056436e-05

```

```

6353 2.26380325e-05 2.32766693e-05 2.83298273e-05]
6354 Centroid: [0.33202334 0.6701071 0.33586507]
6355 x_new: [[0.33237165 0.66946592 0.33541013]]
6356 fx_new [1.30737279e-05]
6357 Expanding
6358
6359 xs: [[0.33271995 0.66882473 0.33495519]
6360 [0.33324262 0.6697375 0.33545938]
6361 [0.33364997 0.67019054 0.33571421]
6362 [0.33135611 0.6698909 0.33581086]
6363 [0.33047979 0.6696012 0.33558086]
6364 [0.33153607 0.67016293 0.33601364]
6365 [0.3322238 0.67041834 0.33615656]]
6366 fxs: [7.66389774e-06 1.39583200e-05 1.81865307e-05 2.04432496e-05
6367 2.18056436e-05 2.26380325e-05 2.32766693e-05]
6368 Centroid: [0.33217262 0.66983231 0.3356701 ]
6369 x_new: [[0.33212143 0.66924628 0.33518364]]
6370 fx_new [1.15467471e-05]
6371 Back to top
6372
6373 xs: [[0.33271995 0.66882473 0.33495519]
6374 [0.33212143 0.66924628 0.33518364]
6375 [0.33324262 0.6697375 0.33545938]
6376 [0.33364997 0.67019054 0.33571421]
6377 [0.33135611 0.6698909 0.33581086]
6378 [0.33047979 0.6696012 0.33558086]
6379 [0.33153607 0.67016293 0.33601364]]
6380 fxs: [7.66389774e-06 1.15467471e-05 1.39583200e-05 1.81865307e-05
6381 2.04432496e-05 2.18056436e-05 2.26380325e-05]
6382 Centroid: [0.33215799 0.66966487 0.33553111]
6383 x_new: [[0.33277991 0.66916681 0.33504859]]
6384 fx_new [9.49908947e-06]
6385 Back to top
6386
6387 xs: [[0.33271995 0.66882473 0.33495519]
6388 [0.33277991 0.66916681 0.33504859]
6389 [0.33212143 0.66924628 0.33518364]
6390 [0.33324262 0.6697375 0.33545938]
6391 [0.33364997 0.67019054 0.33571421]
6392 [0.33135611 0.6698909 0.33581086]
6393 [0.33047979 0.6696012 0.33558086]]
6394 fxs: [7.66389774e-06 9.49908947e-06 1.15467471e-05 1.39583200e-05
6395 1.81865307e-05 2.04432496e-05 2.18056436e-05]
6396 Centroid: [0.33233568 0.66952257 0.33539325]
6397 x_new: [[0.33419158 0.66944393 0.33520563]]
6398 fx_new [1.1955273e-05]
6399 Back to top
6400
6401 xs: [[0.33271995 0.66882473 0.33495519]
6402 [0.33277991 0.66916681 0.33504859]
6403 [0.33212143 0.66924628 0.33518364]
6404 [0.33419158 0.66944393 0.33520563]
6405 [0.33324262 0.6697375 0.33545938]
6406 [0.33364997 0.67019054 0.33571421]
6407 [0.33135611 0.6698909 0.33581086]]
6408 fxs: [7.66389774e-06 9.49908947e-06 1.15467471e-05 1.19552730e-05
6409 1.39583200e-05 1.81865307e-05 2.04432496e-05]
6410 Centroid: [0.33286594 0.6695001 0.33533964]
6411 x_new: [[0.33437577 0.6691093 0.33486842]]
6412 fx_new [9.40962149e-06]
6413 Back to top
6414
6415 xs: [[0.33271995 0.66882473 0.33495519]
6416 [0.33437577 0.6691093 0.33486842]
6417 [0.33277991 0.66916681 0.33504859]
6418 [0.33212143 0.66924628 0.33518364]
6419 [0.33419158 0.66944393 0.33520563]
6420 [0.33324262 0.6697375 0.33545938]
6421 [0.33364997 0.67019054 0.33571421]]
6422 fxs: [7.66389774e-06 9.40962149e-06 9.49908947e-06 1.15467471e-05

```

```

6423 1.19552730e-05 1.39583200e-05 1.81865307e-05]
6424 Centroid: [0.33329732 0.66938844 0.33520501]
6425 x_new: [[0.33294467 0.66858634 0.33469581]]
6426 fx_new [5.6925415e-06]
6427 Expanding
6428
6429 xs: [[0.33259202 0.66778424 0.33418661]
6430 [0.33271995 0.66882473 0.33495519]
6431 [0.33437577 0.6691093 0.33486842]
6432 [0.33277991 0.66916681 0.33504859]
6433 [0.33212143 0.66924628 0.33518364]
6434 [0.33419158 0.66944393 0.33520563]
6435 [0.33324262 0.6697375 0.33545938]]
6436 fxs: [2.52658476e-06 7.66389774e-06 9.40962149e-06 9.49908947e-06
6437 1.15467471e-05 1.19552730e-05 1.39583200e-05]
6438 Centroid: [0.33314618 0.66904468 0.33498678]
6439 x_new: [[0.33304975 0.66835187 0.33451418]]
6440 fx_new [4.3147219e-06]
6441 Back to top
6442
6443 xs: [[0.33259202 0.66778424 0.33418661]
6444 [0.33304975 0.66835187 0.33451418]
6445 [0.33271995 0.66882473 0.33495519]
6446 [0.33437577 0.6691093 0.33486842]
6447 [0.33277991 0.66916681 0.33504859]
6448 [0.33212143 0.66924628 0.33518364]
6449 [0.33419158 0.66944393 0.33520563]]
6450 fxs: [2.52658476e-06 4.31472190e-06 7.66389774e-06 9.40962149e-06
6451 9.49908947e-06 1.15467471e-05 1.19552730e-05]
6452 Centroid: [0.33311863 0.66884674 0.33485175]
6453 x_new: [[0.33204568 0.66824954 0.33449787]]
6454 fx_new [5.51969692e-06]
6455 Back to top
6456
6457 xs: [[0.33259202 0.66778424 0.33418661]
6458 [0.33304975 0.66835187 0.33451418]
6459 [0.33204568 0.66824954 0.33449787]
6460 [0.33271995 0.66882473 0.33495519]
6461 [0.33437577 0.6691093 0.33486842]
6462 [0.33277991 0.66916681 0.33504859]
6463 [0.33212143 0.66924628 0.33518364]]
6464 fxs: [2.52658476e-06 4.31472190e-06 5.51969692e-06 7.66389774e-06
6465 9.40962149e-06 9.49908947e-06 1.15467471e-05]
6466 Centroid: [0.33281207 0.66867611 0.33475064]
6467 x_new: [[0.33350272 0.66810594 0.33431765]]
6468 fx_new [3.06907293e-06]
6469 Back to top
6470
6471 xs: [[0.33259202 0.66778424 0.33418661]
6472 [0.33350272 0.66810594 0.33431765]
6473 [0.33304975 0.66835187 0.33451418]
6474 [0.33204568 0.66824954 0.33449787]
6475 [0.33271995 0.66882473 0.33495519]
6476 [0.33437577 0.6691093 0.33486842]
6477 [0.33277991 0.66916681 0.33504859]]
6478 fxs: [2.52658476e-06 3.06907293e-06 4.31472190e-06 5.51969692e-06
6479 7.66389774e-06 9.40962149e-06 9.49908947e-06]
6480 Centroid: [0.3330094 0.6685132 0.33462693]
6481 x_new: [[0.33323889 0.6678596 0.33420527]]
6482 fx_new [2.1922808e-06]
6483 Expanding
6484
6485 xs: [[0.33346837 0.66720599 0.33378362]
6486 [0.33259202 0.66778424 0.33418661]
6487 [0.33350272 0.66810594 0.33431765]
6488 [0.33304975 0.66835187 0.33451418]
6489 [0.33204568 0.66824954 0.33449787]
6490 [0.33271995 0.66882473 0.33495519]
6491 [0.33437577 0.6691093 0.33486842]]
6492 fxs: [5.11860052e-07 2.52658476e-06 3.06907293e-06 4.31472190e-06

```

```

6493 5.51969692e-06 7.66389774e-06 9.40962149e-06]
6494 Centroid: [0.33310775 0.66823309 0.33444622]
6495 x_new: [[0.33183973 0.66735687 0.33402402]]
6496 fx_new [3.18426791e-06]
6497 Back to top
6498
6499 xs: [[0.33346837 0.66720599 0.33378362]
6500 [0.33259202 0.66778424 0.33418661]
6501 [0.33350272 0.66810594 0.33431765]
6502 [0.33183973 0.66735687 0.33402402]
6503 [0.33304975 0.66835187 0.33451418]
6504 [0.33204568 0.66824954 0.33449787]
6505 [0.33271995 0.66882473 0.33495519]]
6506 fxs: [5.11860052e-07 2.52658476e-06 3.06907293e-06 3.18426791e-06
6507 4.31472190e-06 5.51969692e-06 7.66389774e-06]
6508 Centroid: [0.33274546 0.66798274 0.33432559]
6509 x_new: [[0.33277097 0.66714075 0.33369599]]
6510 fx_new [6.72527158e-07]
6511 Back to top
6512
6513 xs: [[0.33346837 0.66720599 0.33378362]
6514 [0.33277097 0.66714075 0.33369599]
6515 [0.33259202 0.66778424 0.33418661]
6516 [0.33350272 0.66810594 0.33431765]
6517 [0.33183973 0.66735687 0.33402402]
6518 [0.33304975 0.66835187 0.33451418]
6519 [0.33204568 0.66824954 0.33449787]]
6520 fxs: [5.11860052e-07 6.72527158e-07 2.52658476e-06 3.06907293e-06
6521 3.18426791e-06 4.31472190e-06 5.51969692e-06]
6522 Centroid: [0.33275275 0.66774217 0.33414571]
6523 x_new: [[0.33345982 0.6672348 0.33379354]]
6524 fx_new [5.50561988e-07]
6525 Back to top
6526
6527 xs: [[0.33346837 0.66720599 0.33378362]
6528 [0.33345982 0.6672348 0.33379354]
6529 [0.33277097 0.66714075 0.33369599]
6530 [0.33259202 0.66778424 0.33418661]
6531 [0.33350272 0.66810594 0.33431765]
6532 [0.33183973 0.66735687 0.33402402]
6533 [0.33304975 0.66835187 0.33451418]]
6534 fxs: [5.11860052e-07 5.50561988e-07 6.72527158e-07 2.52658476e-06
6535 3.06907293e-06 3.18426791e-06 4.31472190e-06]
6536 Centroid: [0.33295477 0.66759721 0.33404509]
6537 x_new: [[0.33285979 0.66684255 0.33357599]]
6538 fx_new [3.14057014e-07]
6539 Expanding
6540
6541 xs: [[0.33285979 0.66684255 0.33357599]
6542 [0.33346837 0.66720599 0.33378362]
6543 [0.33345982 0.6672348 0.33379354]
6544 [0.33277097 0.66714075 0.33369599]
6545 [0.33259202 0.66778424 0.33418661]
6546 [0.33350272 0.66810594 0.33431765]
6547 [0.33183973 0.66735687 0.33402402]]
6548 fxs: [3.14057014e-07 5.11860052e-07 5.50561988e-07 6.72527158e-07
6549 2.52658476e-06 3.06907293e-06 3.18426791e-06]
6550 Centroid: [0.33292763 0.66738159 0.33391106]
6551 x_new: [[0.33401553 0.66740631 0.3337981 ]]
6552 fx_new [1.2284729e-06]
6553 Back to top
6554
6555 xs: [[0.33285979 0.66684255 0.33357599]
6556 [0.33346837 0.66720599 0.33378362]
6557 [0.33345982 0.6672348 0.33379354]
6558 [0.33277097 0.66714075 0.33369599]
6559 [0.33401553 0.66740631 0.3337981 ]
6560 [0.33259202 0.66778424 0.33418661]
6561 [0.33350272 0.66810594 0.33431765]]
6562 fxs: [3.14057014e-07 5.11860052e-07 5.50561988e-07 6.72527158e-07

```

```

6563 1.22847290e-06 2.52658476e-06 3.06907293e-06]
6564 Centroid: [0.33323846 0.66738865 0.33387879]
6565 x_new: [[0.3329742 0.66667137 0.33343992]]
6566 fx_new [1.4035733e-07]
6567 Expanding
6568
6569 xs: [[0.3329742 0.66667137 0.33343992]
6570 [0.33285979 0.66684255 0.33357599]
6571 [0.33346837 0.66720599 0.33378362]
6572 [0.33345982 0.6672348 0.33379354]
6573 [0.33277097 0.66714075 0.33369599]
6574 [0.33401553 0.66740631 0.3337981 ]
6575 [0.33259202 0.66778424 0.33418661]]
6576 fxs: [1.40357330e-07 3.14057014e-07 5.11860052e-07 5.50561988e-07
6577 6.72527158e-07 1.22847290e-06 2.52658476e-06]
6578 Centroid: [0.33316296 0.66718371 0.3337534 ]
6579 x_new: [[0.3337339 0.66658319 0.33332018]]
6580 fx_new [1.67591559e-07]
6581 Back to top
6582
6583 xs: [[0.3329742 0.66667137 0.33343992]
6584 [0.3337339 0.66658319 0.33332018]
6585 [0.33285979 0.66684255 0.33357599]
6586 [0.33346837 0.66720599 0.33378362]
6587 [0.33345982 0.6672348 0.33379354]
6588 [0.33277097 0.66714075 0.33369599]
6589 [0.33401553 0.66740631 0.3337981 ]]
6590 fxs: [1.40357330e-07 1.67591559e-07 3.14057014e-07 5.11860052e-07
6591 5.50561988e-07 6.72527158e-07 1.22847290e-06]
6592 Centroid: [0.33332608 0.66701214 0.33362962]
6593 x_new: [[0.33263664 0.66661796 0.33346114]]
6594 fx_new [5.04093677e-07]
6595 Back to top
6596
6597 xs: [[0.3329742 0.66667137 0.33343992]
6598 [0.3337339 0.66658319 0.33332018]
6599 [0.33285979 0.66684255 0.33357599]
6600 [0.33263664 0.66661796 0.33346114]
6601 [0.33346837 0.66720599 0.33378362]
6602 [0.33345982 0.6672348 0.33379354]
6603 [0.33277097 0.66714075 0.33369599]]
6604 fxs: [1.40357330e-07 1.67591559e-07 3.14057014e-07 5.04093677e-07
6605 5.11860052e-07 5.50561988e-07 6.72527158e-07]
6606 Centroid: [0.3331291 0.66689952 0.33358148]
6607 x_new: [[0.33348723 0.66665828 0.33346697]]
6608 fx_new [4.16139147e-08]
6609 Expanding
6610
6611 xs: [[0.33348723 0.66665828 0.33346697]
6612 [0.3329742 0.66667137 0.33343992]
6613 [0.3337339 0.66658319 0.33332018]
6614 [0.33285979 0.66684255 0.33357599]
6615 [0.33263664 0.66661796 0.33346114]
6616 [0.33346837 0.66720599 0.33378362]
6617 [0.33345982 0.6672348 0.33379354]]
6618 fxs: [4.16139147e-08 1.40357330e-07 1.67591559e-07 3.14057014e-07
6619 5.04093677e-07 5.11860052e-07 5.50561988e-07]
6620 Centroid: [0.33323142 0.66683059 0.33354877]
6621 x_new: [[0.33300302 0.66642638 0.333304 ]]
6622 fx_new [1.67701013e-07]
6623 Back to top
6624
6625 xs: [[0.33348723 0.66665828 0.33346697]
6626 [0.3329742 0.66667137 0.33343992]
6627 [0.3337339 0.66658319 0.33332018]
6628 [0.33300302 0.66642638 0.333304 ]
6629 [0.33285979 0.66684255 0.33357599]
6630 [0.33263664 0.66661796 0.33346114]
6631 [0.33346837 0.66720599 0.33378362]]
6632 fxs: [4.16139147e-08 1.40357330e-07 1.67591559e-07 1.67701013e-07

```

```

6633 3.14057014e-07 5.04093677e-07 5.11860052e-07]
6634 Centroid: [0.33316617 0.6667151 0.33347883]
6635 x_new: [[0.33286396 0.66622422 0.33317405]]
6636 fx_new [4.41448043e-07]
6637 Back to top
6638
6639 xs: [[0.33348723 0.66665828 0.33346697]
6640 [0.3329742 0.66667137 0.33343992]
6641 [0.3337339 0.66658319 0.33332018]
6642 [0.33300302 0.66642638 0.333304 ]
6643 [0.33285979 0.66684255 0.33357599]
6644 [0.33286396 0.66622422 0.33317405]
6645 [0.33263664 0.66661796 0.33346114]]
6646 fxs: [4.16139147e-08 1.40357330e-07 1.67591559e-07 1.67701013e-07
6647 3.14057014e-07 4.41448043e-07 5.04093677e-07]
6648 Centroid: [0.33307982 0.66657485 0.33339175]
6649 x_new: [[0.333523 0.66653174 0.33332236]]
6650 fx_new [5.43012118e-08]
6651 Back to top
6652
6653 xs: [[0.33348723 0.66665828 0.33346697]
6654 [0.333523 0.66653174 0.33332236]
6655 [0.3329742 0.66667137 0.33343992]
6656 [0.3337339 0.66658319 0.33332018]
6657 [0.33300302 0.66642638 0.333304 ]
6658 [0.33285979 0.66684255 0.33357599]
6659 [0.33286396 0.66622422 0.33317405]]
6660 fxs: [4.16139147e-08 5.43012118e-08 1.40357330e-07 1.67591559e-07
6661 1.67701013e-07 3.14057014e-07 4.41448043e-07]
6662 Centroid: [0.33320644 0.66656253 0.33337192]
6663 x_new: [[0.33354893 0.66690085 0.3335698 ]]
6664 fx_new [1.57240601e-07]
6665 Back to top
6666
6667 xs: [[0.33348723 0.66665828 0.33346697]
6668 [0.333523 0.66653174 0.33332236]
6669 [0.3329742 0.66667137 0.33343992]
6670 [0.33354893 0.66690085 0.3335698 ]
6671 [0.3337339 0.66658319 0.33332018]
6672 [0.33300302 0.66642638 0.333304 ]
6673 [0.33285979 0.66684255 0.33357599]]
6674 fxs: [4.16139147e-08 5.43012118e-08 1.40357330e-07 1.57240601e-07
6675 1.67591559e-07 1.67701013e-07 3.14057014e-07]
6676 Centroid: [0.3333043 0.66665919 0.33342846]
6677 x_new: [[0.3337488 0.66647584 0.33328093]]
6678 fx_new [2.11774842e-07]
6679 Back to top
6680
6681 xs: [[0.33348723 0.66665828 0.33346697]
6682 [0.333523 0.66653174 0.33332236]
6683 [0.3329742 0.66667137 0.33343992]
6684 [0.33354893 0.66690085 0.3335698 ]
6685 [0.3337339 0.66658319 0.33332018]
6686 [0.33300302 0.66642638 0.333304 ]
6687 [0.3337488 0.66647584 0.33328093]]
6688 fxs: [4.16139147e-08 5.43012118e-08 1.40357330e-07 1.57240601e-07
6689 1.67591559e-07 1.67701013e-07 2.11774842e-07]
6690 Centroid: [0.3334313 0.66660681 0.33338631]
6691 x_new: [[0.3331138 0.66673777 0.33349169]]
6692 fx_new [7.83293647e-08]
6693 Back to top
6694
6695 xs: [[0.33348723 0.66665828 0.33346697]
6696 [0.333523 0.66653174 0.33332236]
6697 [0.3331138 0.66673777 0.33349169]
6698 [0.3329742 0.66667137 0.33343992]
6699 [0.33354893 0.66690085 0.3335698 ]
6700 [0.3337339 0.66658319 0.33332018]
6701 [0.33300302 0.66642638 0.333304 ]]
6702 fxs: [4.16139147e-08 5.43012118e-08 7.83293647e-08 1.40357330e-07

```



```

6703 1.57240601e-07 1.67591559e-07 1.67701013e-07]
6704 Centroid: [0.33334058 0.66664423 0.33341642]
6705 x_new: [[0.33367814 0.66686207 0.33352884]]
6706 fx_new [1.95298084e-07]
6707 Contracting
6708
6709 xs: [[0.33323932 0.66657887 0.33338269]
6710 [0.33348723 0.66665828 0.33346697]
6711 [0.333523 0.66653174 0.33332236]
6712 [0.3331138 0.66673777 0.33349169]
6713 [0.3329742 0.66667137 0.33343992]
6714 [0.33354893 0.66690085 0.3335698 ]
6715 [0.3337339 0.66658319 0.33332018]]
6716 fxs: [1.89833466e-08 4.16139147e-08 5.43012118e-08 7.83293647e-08
6717 1.40357330e-07 1.57240601e-07 1.67591559e-07]
6718 Centroid: [0.33337434 0.66666601 0.33342766]
6719 x_new: [[0.33301478 0.66674883 0.33353514]]
6720 fx_new [1.48950874e-07]
6721 Back to top
6722
6723 xs: [[0.33323932 0.66657887 0.33338269]
6724 [0.33348723 0.66665828 0.33346697]
6725 [0.333523 0.66653174 0.33332236]
6726 [0.3331138 0.66673777 0.33349169]
6727 [0.3329742 0.66667137 0.33343992]
6728 [0.33301478 0.66674883 0.33353514]
6729 [0.33354893 0.66690085 0.3335698 ]]
6730 fxs: [1.89833466e-08 4.16139147e-08 5.43012118e-08 7.83293647e-08
6731 1.40357330e-07 1.48950874e-07 1.57240601e-07]
6732 Centroid: [0.33327161 0.66668967 0.33345837]
6733 x_new: [[0.33299429 0.6664785 0.33334693]]
6734 fx_new [1.50545272e-07]
6735 Back to top
6736
6737 xs: [[0.33323932 0.66657887 0.33338269]
6738 [0.33348723 0.66665828 0.33346697]
6739 [0.333523 0.66653174 0.33332236]
6740 [0.3331138 0.66673777 0.33349169]
6741 [0.3329742 0.66667137 0.33343992]
6742 [0.33301478 0.66674883 0.33353514]
6743 [0.33299429 0.6664785 0.33334693]]
6744 fxs: [1.89833466e-08 4.16139147e-08 5.43012118e-08 7.83293647e-08
6745 1.40357330e-07 1.48950874e-07 1.50545272e-07]
6746 Centroid: [0.33319237 0.66662934 0.33342653]
6747 x_new: [[0.33339046 0.66678018 0.33350613]]
6748 fx_new [4.60052921e-08]
6749 Back to top
6750
6751 xs: [[0.33323932 0.66657887 0.33338269]
6752 [0.33348723 0.66665828 0.33346697]
6753 [0.33339046 0.66678018 0.33350613]
6754 [0.333523 0.66653174 0.33332236]
6755 [0.3331138 0.66673777 0.33349169]
6756 [0.3329742 0.66667137 0.33343992]
6757 [0.33301478 0.66674883 0.33353514]]
6758 fxs: [1.89833466e-08 4.16139147e-08 4.60052921e-08 5.43012118e-08
6759 7.83293647e-08 1.40357330e-07 1.48950874e-07]
6760 Centroid: [0.33324897 0.66667243 0.33344927]
6761 x_new: [[0.33348316 0.66659604 0.3333634 ]]
6762 fx_new [2.8339988e-08]
6763 Back to top
6764
6765 xs: [[0.33323932 0.66657887 0.33338269]
6766 [0.33348316 0.66659604 0.3333634 ]
6767 [0.33348723 0.66665828 0.33346697]
6768 [0.33339046 0.66678018 0.33350613]
6769 [0.333523 0.66653174 0.33332236]
6770 [0.3331138 0.66673777 0.33349169]
6771 [0.3329742 0.66667137 0.33343992]]
6772 fxs: [1.89833466e-08 2.83399880e-08 4.16139147e-08 4.60052921e-08

```

```

6773 5.43012118e-08 7.83293647e-08 1.40357330e-07]
6774 Centroid: [0.33331588 0.66665061 0.33342474]
6775 x_new: [[0.33365756 0.66662985 0.33340955]]
6776 fx_new [1.12286639e-07]
6777 Back to top
6778
6779 xs: [[0.33323932 0.66657887 0.33338269]
6780 [0.33348316 0.66659604 0.3333634 ]
6781 [0.33348723 0.66665828 0.33346697]
6782 [0.33339046 0.66678018 0.33350613]
6783 [0.333523 0.66653174 0.33332236]
6784 [0.3331138 0.66673777 0.33349169]
6785 [0.33365756 0.66662985 0.33340955]]
6786 fxs: [1.89833466e-08 2.83399880e-08 4.16139147e-08 4.60052921e-08
6787 5.43012118e-08 7.83293647e-08 1.12286639e-07]
6788 Centroid: [0.3334135 0.66664468 0.3334204 ]
6789 x_new: [[0.33316945 0.6666595 0.33343125]]
6790 fx_new [3.64966848e-08]
6791 Back to top
6792
6793 xs: [[0.33323932 0.66657887 0.33338269]
6794 [0.33348316 0.66659604 0.3333634 ]
6795 [0.33316945 0.6666595 0.33343125]
6796 [0.33348723 0.66665828 0.33346697]
6797 [0.33339046 0.66678018 0.33350613]
6798 [0.333523 0.66653174 0.33332236]
6799 [0.3331138 0.66673777 0.33349169]]
6800 fxs: [1.89833466e-08 2.83399880e-08 3.64966848e-08 4.16139147e-08
6801 4.60052921e-08 5.43012118e-08 7.83293647e-08]
6802 Centroid: [0.33334377 0.66664891 0.3334235 ]
6803 x_new: [[0.33357375 0.66656005 0.33335531]]
6804 fx_new [6.96503144e-08]
6805 Back to top
6806
6807 xs: [[0.33323932 0.66657887 0.33338269]
6808 [0.33348316 0.66659604 0.3333634 ]
6809 [0.33316945 0.6666595 0.33343125]
6810 [0.33348723 0.66665828 0.33346697]
6811 [0.33339046 0.66678018 0.33350613]
6812 [0.333523 0.66653174 0.33332236]
6813 [0.33357375 0.66656005 0.33335531]]
6814 fxs: [1.89833466e-08 2.83399880e-08 3.64966848e-08 4.16139147e-08
6815 4.60052921e-08 5.43012118e-08 6.96503144e-08]
6816 Centroid: [0.33340948 0.66662352 0.33340402]
6817 x_new: [[0.33324521 0.666687 0.33345272]]
6818 fx_new [2.2432677e-08]
6819 Back to top
6820
6821 xs: [[0.33323932 0.66657887 0.33338269]
6822 [0.33324521 0.666687 0.33345272]
6823 [0.33348316 0.66659604 0.3333634 ]
6824 [0.33316945 0.6666595 0.33343125]
6825 [0.33348723 0.66665828 0.33346697]
6826 [0.33339046 0.66678018 0.33350613]
6827 [0.333523 0.66653174 0.33332236]]
6828 fxs: [1.89833466e-08 2.24326770e-08 2.83399880e-08 3.64966848e-08
6829 4.16139147e-08 4.60052921e-08 5.43012118e-08]
6830 Centroid: [0.33336255 0.66664166 0.33341793]
6831 x_new: [[0.33320209 0.66675158 0.3335135 ]]
6832 fx_new [5.68966275e-08]
6833 Contracting
6834
6835 xs: [[0.33341068 0.66660868 0.33338926]
6836 [0.33323932 0.66657887 0.33338269]
6837 [0.33324521 0.666687 0.33345272]
6838 [0.33348316 0.66659604 0.3333634 ]
6839 [0.33316945 0.6666595 0.33343125]
6840 [0.33348723 0.66665828 0.33346697]
6841 [0.33339046 0.66678018 0.33350613]]
6842 fxs: [1.24732362e-08 1.89833466e-08 2.24326770e-08 2.83399880e-08

```

```

6843 3.64966848e-08 4.16139147e-08 4.60052921e-08]
6844 Centroid: [0.3333465 0.66665265 0.33342749]
6845 x_new: [[0.33330254 0.66652512 0.33334885]]
6846 fx_new [2.1223291e-08]
6847 Back to top
6848
6849 xs: [[0.33341068 0.66660868 0.33338926]
6850 [0.33323932 0.66657887 0.33338269]
6851 [0.33330254 0.66652512 0.33334885]
6852 [0.33324521 0.666687 0.33345272]
6853 [0.33348316 0.66659604 0.3333634 ]
6854 [0.33316945 0.6666595 0.33343125]
6855 [0.33348723 0.66665828 0.33346697]]
6856 fxs: [1.24732362e-08 1.89833466e-08 2.12232910e-08 2.24326770e-08
6857 2.83399880e-08 3.64966848e-08 4.16139147e-08]
6858 Centroid: [0.33333394 0.66661621 0.33340502]
6859 x_new: [[0.33318065 0.66657415 0.33334307]]
6860 fx_new [3.19660648e-08]
6861 Back to top
6862
6863 xs: [[0.33341068 0.66660868 0.33338926]
6864 [0.33323932 0.66657887 0.33338269]
6865 [0.33330254 0.66652512 0.33334885]
6866 [0.33324521 0.666687 0.33345272]
6867 [0.33348316 0.66659604 0.3333634 ]
6868 [0.33318065 0.66657415 0.33334307]
6869 [0.33316945 0.6666595 0.33343125]]
6870 fxs: [1.24732362e-08 1.89833466e-08 2.12232910e-08 2.24326770e-08
6871 2.83399880e-08 3.19660648e-08 3.64966848e-08]
6872 Centroid: [0.33329014 0.66660419 0.33338732]
6873 x_new: [[0.33341084 0.66654889 0.3333434 ]]
6874 fx_new [1.99809357e-08]
6875 Back to top
6876
6877 xs: [[0.33341068 0.66660868 0.33338926]
6878 [0.33323932 0.66657887 0.33338269]
6879 [0.33341084 0.66654889 0.3333434 ]
6880 [0.33330254 0.66652512 0.33334885]
6881 [0.33324521 0.666687 0.33345272]
6882 [0.33348316 0.66659604 0.3333634 ]
6883 [0.33318065 0.66657415 0.33334307]]
6884 fxs: [1.24732362e-08 1.89833466e-08 1.99809357e-08 2.12232910e-08
6885 2.24326770e-08 2.83399880e-08 3.19660648e-08]
6886 Centroid: [0.33332463 0.66658839 0.33337477]
6887 x_new: [[0.3334686 0.66660264 0.33340647]]
6888 fx_new [2.77473897e-08]
6889 Back to top
6890
6891 xs: [[0.33341068 0.66660868 0.33338926]
6892 [0.33323932 0.66657887 0.33338269]
6893 [0.33341084 0.66654889 0.3333434 ]
6894 [0.33330254 0.66652512 0.33334885]
6895 [0.33324521 0.666687 0.33345272]
6896 [0.3334686 0.66660264 0.33340647]
6897 [0.33348316 0.66659604 0.3333634 ]]
6898 fxs: [1.24732362e-08 1.89833466e-08 1.99809357e-08 2.12232910e-08
6899 2.24326770e-08 2.77473897e-08 2.83399880e-08]
6900 Centroid: [0.33336576 0.66659246 0.33338383]
6901 x_new: [[0.33324837 0.66658889 0.33340425]]
6902 fx_new [1.82978426e-08]
6903 Back to top
6904
6905 xs: [[0.33341068 0.66660868 0.33338926]
6906 [0.33324837 0.66658889 0.33340425]
6907 [0.33323932 0.66657887 0.33338269]
6908 [0.33341084 0.66654889 0.3333434 ]
6909 [0.33330254 0.66652512 0.33334885]
6910 [0.33324521 0.666687 0.33345272]
6911 [0.3334686 0.66660264 0.33340647]]
6912 fxs: [1.24732362e-08 1.82978426e-08 1.89833466e-08 1.99809357e-08

```

```

6913 2.12232910e-08 2.24326770e-08 2.77473897e-08]
6914 Centroid: [0.33333222 0.66659144 0.33338966]
6915 x_new: [[0.33319584 0.66658024 0.33337286]]
6916 fx_new [2.7934525e-08]
6917 Contracting
6918
6919 xs: [[0.33337314 0.6665948 0.33339471]
6920 [0.33341068 0.66660868 0.33338926]
6921 [0.33324837 0.66658889 0.33340425]
6922 [0.33323932 0.66657887 0.33338269]
6923 [0.33341084 0.66654889 0.3333434 ]
6924 [0.33330254 0.66652512 0.33334885]
6925 [0.33324521 0.666687 0.33345272]]
6926 fxs: [1.05159854e-08 1.24732362e-08 1.82978426e-08 1.89833466e-08
6927 1.99809357e-08 2.12232910e-08 2.24326770e-08]
6928 Centroid: [0.33331859 0.66659032 0.33338798]
6929 x_new: [[0.33339196 0.66649365 0.33332324]]
6930 fx_new [3.34750706e-08]
6931 Contracting
6932
6933 xs: [[0.33329657 0.66661932 0.33340741]
6934 [0.33337314 0.6665948 0.33339471]
6935 [0.33341068 0.66660868 0.33338926]
6936 [0.33324837 0.66658889 0.33340425]
6937 [0.33323932 0.66657887 0.33338269]
6938 [0.33341084 0.66654889 0.3333434 ]
6939 [0.33330254 0.66652512 0.33334885]]
6940 fxs: [9.07934284e-09 1.05159854e-08 1.24732362e-08 1.82978426e-08
6941 1.89833466e-08 1.99809357e-08 2.12232910e-08]
6942 Centroid: [0.33332592 0.66658065 0.33338151]
6943 x_new: [[0.33334931 0.66663618 0.33341417]]
6944 fx_new [7.71838565e-09]
6945 Expanding
6946
6947 xs: [[0.33334931 0.66663618 0.33341417]
6948 [0.33329657 0.66661932 0.33340741]
6949 [0.33337314 0.6665948 0.33339471]
6950 [0.33341068 0.66660868 0.33338926]
6951 [0.33324837 0.66658889 0.33340425]
6952 [0.33323932 0.66657887 0.33338269]
6953 [0.33341084 0.66654889 0.3333434 ]]
6954 fxs: [7.71838565e-09 9.07934284e-09 1.05159854e-08 1.24732362e-08
6955 1.82978426e-08 1.89833466e-08 1.99809357e-08]
6956 Centroid: [0.3333326 0.66659652 0.33339084]
6957 x_new: [[0.33325437 0.66664415 0.33343828]]
6958 fx_new [1.77570672e-08]
6959 Back to top
6960
6961 xs: [[0.33334931 0.66663618 0.33341417]
6962 [0.33329657 0.66661932 0.33340741]
6963 [0.33337314 0.6665948 0.33339471]
6964 [0.33341068 0.66660868 0.33338926]
6965 [0.33325437 0.66664415 0.33343828]
6966 [0.33324837 0.66658889 0.33340425]
6967 [0.33323932 0.66657887 0.33338269]]
6968 fxs: [7.71838565e-09 9.07934284e-09 1.05159854e-08 1.24732362e-08
6969 1.77570672e-08 1.82978426e-08 1.89833466e-08]
6970 Centroid: [0.33331025 0.66661013 0.3334044 ]
6971 x_new: [[0.33338119 0.66664138 0.3334261 ]]
6972 fx_new [1.15346663e-08]
6973 Back to top
6974
6975 xs: [[0.33334931 0.66663618 0.33341417]
6976 [0.33329657 0.66661932 0.33340741]
6977 [0.33337314 0.6665948 0.33339471]
6978 [0.33338119 0.66664138 0.3334261 ]
6979 [0.33341068 0.66660868 0.33338926]
6980 [0.33325437 0.66664415 0.33343828]
6981 [0.33324837 0.66658889 0.33340425]]
6982 fxs: [7.71838565e-09 9.07934284e-09 1.05159854e-08 1.15346663e-08

```

```

6983 1.24732362e-08 1.77570672e-08 1.82978426e-08]
6984 Centroid: [0.33333052 0.66661906 0.3334106 ]
6985 x_new: [[0.33341266 0.66664923 0.33341694]]
6986 fx_new [1.35875612e-08]
6987 Back to top
6988
6989 xs: [[0.33334931 0.66663618 0.33341417]
6990 [0.33329657 0.66661932 0.33340741]
6991 [0.33337314 0.6665948 0.33339471]
6992 [0.33338119 0.66664138 0.3334261 ]
6993 [0.33341068 0.66660868 0.33338926]
6994 [0.33341266 0.66664923 0.33341694]
6995 [0.33325437 0.66664415 0.33343828]]
6996 fxs: [7.71838565e-09 9.07934284e-09 1.05159854e-08 1.15346663e-08
6997 1.24732362e-08 1.35875612e-08 1.77570672e-08]
6998 Centroid: [0.33335399 0.66662768 0.33341241]
6999 x_new: [[0.33345361 0.66661121 0.33338653]]
7000 fx_new [2.0372496e-08]
7001 Contracting
7002
7003 xs: [[0.33334931 0.66663618 0.33341417]
7004 [0.3333241 0.66663262 0.33342017]
7005 [0.33329657 0.66661932 0.33340741]
7006 [0.33337314 0.6665948 0.33339471]
7007 [0.33338119 0.66664138 0.3334261 ]
7008 [0.33341068 0.66660868 0.33338926]
7009 [0.33341266 0.66664923 0.33341694]]
7010 fxs: [7.71838565e-09 8.78518174e-09 9.07934284e-09 1.05159854e-08
7011 1.15346663e-08 1.24732362e-08 1.35875612e-08]
7012 Centroid: [0.33336395 0.66662603 0.33340982]
7013 x_new: [[0.33331524 0.66660283 0.3334027 ]]
7014 fx_new [9.21436291e-09]
7015 Back to top
7016
7017 xs: [[0.33334931 0.66663618 0.33341417]
7018 [0.3333241 0.66663262 0.33342017]
7019 [0.33329657 0.66661932 0.33340741]
7020 [0.33331524 0.66660283 0.3334027 ]
7021 [0.33337314 0.6665948 0.33339471]
7022 [0.33338119 0.66664138 0.3334261 ]
7023 [0.33341068 0.66660868 0.33338926]]
7024 fxs: [7.71838565e-09 8.78518174e-09 9.07934284e-09 9.21436291e-09
7025 1.05159854e-08 1.15346663e-08 1.24732362e-08]
7026 Centroid: [0.33335003 0.6666194 0.33340779]
7027 x_new: [[0.33328938 0.66663013 0.33342631]]
7028 fx_new [1.19124826e-08]
7029 Back to top
7030
7031 xs: [[0.33334931 0.66663618 0.33341417]
7032 [0.3333241 0.66663262 0.33342017]
7033 [0.33329657 0.66661932 0.33340741]
7034 [0.33331524 0.66660283 0.3334027 ]
7035 [0.33337314 0.6665948 0.33339471]
7036 [0.33338119 0.66664138 0.3334261 ]
7037 [0.33328938 0.66663013 0.33342631]]
7038 fxs: [7.71838565e-09 8.78518174e-09 9.07934284e-09 9.21436291e-09
7039 1.05159854e-08 1.15346663e-08 1.19124826e-08]
7040 Centroid: [0.3333327 0.66662247 0.33341308]
7041 x_new: [[0.33337603 0.66661481 0.33339985]]
7042 fx_new [8.93607547e-09]
7043 Back to top
7044
7045 xs: [[0.33334931 0.66663618 0.33341417]
7046 [0.3333241 0.66663262 0.33342017]
7047 [0.33337603 0.66661481 0.33339985]
7048 [0.33329657 0.66661932 0.33340741]
7049 [0.33331524 0.66660283 0.3334027 ]
7050 [0.33337314 0.6665948 0.33339471]
7051 [0.33338119 0.66664138 0.3334261 ]]
7052 fxs: [7.71838565e-09 8.78518174e-09 8.93607547e-09 9.07934284e-09

```

```

7053 9.21436291e-09 1.05159854e-08 1.15346663e-08]
7054 Centroid: [0.33334508 0.66662028 0.3334093 ]
7055 x_new: [[0.33330898 0.66659917 0.3333925 ]]
7056 fx_new [8.64932486e-09]
7057 Back to top
7058
7059 xs: [[0.33334931 0.66663618 0.33341417]
7060 [0.33330898 0.66659917 0.3333925 ]
7061 [0.3333241 0.66663262 0.33342017]
7062 [0.33337603 0.66661481 0.33339985]
7063 [0.33329657 0.66661932 0.33340741]
7064 [0.33331524 0.66660283 0.3334027 ]
7065 [0.33337314 0.6665948 0.33339471]]
7066 fxs: [7.71838565e-09 8.64932486e-09 8.78518174e-09 8.93607547e-09
7067 9.07934284e-09 9.21436291e-09 1.05159854e-08]
7068 Centroid: [0.33333477 0.66661425 0.3334045 ]
7069 x_new: [[0.33329639 0.6666337 0.33341429]]
7070 fx_new [9.00604844e-09]
7071 Back to top
7072
7073 xs: [[0.33334931 0.66663618 0.33341417]
7074 [0.33330898 0.66659917 0.3333925 ]
7075 [0.3333241 0.66663262 0.33342017]
7076 [0.33337603 0.66661481 0.33339985]
7077 [0.33329639 0.6666337 0.33341429]
7078 [0.33329657 0.66661932 0.33340741]
7079 [0.33331524 0.66660283 0.3334027 ]]
7080 fxs: [7.71838565e-09 8.64932486e-09 8.78518174e-09 8.93607547e-09
7081 9.00604844e-09 9.07934284e-09 9.21436291e-09]
7082 Centroid: [0.3333238 0.66661981 0.3334073 ]
7083 x_new: [[0.33333237 0.66663678 0.33341189]]
7084 fx_new [7.06594983e-09]
7085 Expanding
7086
7087 xs: [[0.33333237 0.66663678 0.33341189]
7088 [0.33334931 0.66663618 0.33341417]
7089 [0.33330898 0.66659917 0.3333925 ]
7090 [0.3333241 0.66663262 0.33342017]
7091 [0.33337603 0.66661481 0.33339985]
7092 [0.33329639 0.6666337 0.33341429]
7093 [0.33329657 0.66661932 0.33340741]]
7094 fxs: [7.06594983e-09 7.71838565e-09 8.64932486e-09 8.78518174e-09
7095 8.93607547e-09 9.00604844e-09 9.07934284e-09]
7096 Centroid: [0.33332625 0.66662466 0.33340861]
7097 x_new: [[0.33335593 0.66662999 0.33340982]]
7098 fx_new [7.70555467e-09]
7099 Back to top
7100
7101 xs: [[0.33333237 0.66663678 0.33341189]
7102 [0.33335593 0.66662999 0.33340982]
7103 [0.33334931 0.66663618 0.33341417]
7104 [0.33330898 0.66659917 0.3333925 ]
7105 [0.3333241 0.66663262 0.33342017]
7106 [0.33337603 0.66661481 0.33339985]
7107 [0.33329639 0.6666337 0.33341429]]
7108 fxs: [7.06594983e-09 7.70555467e-09 7.71838565e-09 8.64932486e-09
7109 8.78518174e-09 8.93607547e-09 9.00604844e-09]
7110 Centroid: [0.33333473 0.66662618 0.33340896]
7111 x_new: [[0.33337306 0.66661866 0.33340362]]
7112 fx_new [8.82313187e-09]
7113 Back to top
7114
7115 xs: [[0.33333237 0.66663678 0.33341189]
7116 [0.33335593 0.66662999 0.33340982]
7117 [0.33334931 0.66663618 0.33341417]
7118 [0.33330898 0.66659917 0.3333925 ]
7119 [0.3333241 0.66663262 0.33342017]
7120 [0.33337306 0.66661866 0.33340362]
7121 [0.33337603 0.66661481 0.33339985]]
7122 fxs: [7.06594983e-09 7.70555467e-09 7.71838565e-09 8.64932486e-09

```

```

7123 8.78518174e-09 8.82313187e-09 8.93607547e-09]
7124 Centroid: [0.33334568 0.66662403 0.33340743]
7125 x_new: [[0.33331534 0.66663325 0.33341501]]
7126 fx_new [8.11215744e-09]
7127 Back to top
7128
7129 xs: [[0.33333237 0.66663678 0.33341189]
7130 [0.33335593 0.66662999 0.33340982]
7131 [0.33334931 0.66663618 0.33341417]
7132 [0.33331534 0.66663325 0.33341501]
7133 [0.33330898 0.66659917 0.3333925 ]
7134 [0.3333241 0.66663262 0.33342017]
7135 [0.33337306 0.66661866 0.33340362]]
7136 fxs: [7.06594983e-09 7.70555467e-09 7.71838565e-09 8.11215744e-09
7137 8.64932486e-09 8.78518174e-09 8.82313187e-09]
7138 Centroid: [0.33333701 0.66662666 0.3334096 ]
7139 x_new: [[0.33330096 0.66663467 0.33341558]]
7140 fx_new [8.83579036e-09]
7141 Contracting
7142
7143 xs: [[0.33333237 0.66663678 0.33341189]
7144 [0.33334783 0.66662426 0.3334078 ]
7145 [0.33335593 0.66662999 0.33340982]
7146 [0.33334931 0.66663618 0.33341417]
7147 [0.33331534 0.66663325 0.33341501]
7148 [0.33330898 0.66659917 0.3333925 ]
7149 [0.3333241 0.66663262 0.33342017]]
7150 fxs: [7.06594983e-09 7.55393186e-09 7.70555467e-09 7.71838565e-09
7151 8.11215744e-09 8.64932486e-09 8.78518174e-09]
7152 Centroid: [0.33333341 0.66662747 0.3334102 ]
7153 x_new: [[0.33334271 0.66662231 0.33340022]]
7154 fx_new [6.52912898e-09]
7155 Expanding
7156
7157 xs: [[0.33335201 0.66661715 0.33339024]
7158 [0.33333237 0.66663678 0.33341189]
7159 [0.33334783 0.66662426 0.3334078 ]
7160 [0.33335593 0.66662999 0.33340982]
7161 [0.33334931 0.66663618 0.33341417]
7162 [0.33331534 0.66663325 0.33341501]
7163 [0.33330898 0.66659917 0.3333925 ]]
7164 fxs: [6.03908054e-09 7.06594983e-09 7.55393186e-09 7.70555467e-09
7165 7.71838565e-09 8.11215744e-09 8.64932486e-09]
7166 Centroid: [0.33333739 0.66662526 0.33340592]
7167 x_new: [[0.33336581 0.66665134 0.33341934]]
7168 fx_new [8.68656828e-09]
7169 Contracting
7170
7171 xs: [[0.33335201 0.66661715 0.33339024]
7172 [0.33333237 0.66663678 0.33341189]
7173 [0.33332887 0.66661743 0.33340189]
7174 [0.33334783 0.66662426 0.3334078 ]
7175 [0.33335593 0.66662999 0.33340982]
7176 [0.33334931 0.66663618 0.33341417]
7177 [0.33331534 0.66663325 0.33341501]]
7178 fxs: [6.03908054e-09 7.06594983e-09 7.14463428e-09 7.55393186e-09
7179 7.70555467e-09 7.71838565e-09 8.11215744e-09]
7180 Centroid: [0.33334023 0.66662786 0.33340726]
7181 x_new: [[0.33336513 0.66662248 0.33339951]]
7182 fx_new [7.34327165e-09]
7183 Back to top
7184
7185 xs: [[0.33335201 0.66661715 0.33339024]
7186 [0.33333237 0.66663678 0.33341189]
7187 [0.33332887 0.66661743 0.33340189]
7188 [0.33336513 0.66662248 0.33339951]
7189 [0.33334783 0.66662426 0.3334078 ]
7190 [0.33335593 0.66662999 0.33340982]
7191 [0.33334931 0.66663618 0.33341417]]
7192 fxs: [6.03908054e-09 7.06594983e-09 7.14463428e-09 7.34327165e-09

```

```

7193 7.55393186e-09 7.70555467e-09 7.71838565e-09]
7194 Centroid: [0.33334735 0.66662632 0.33340505]
7195 x_new: [[0.33334539 0.66661647 0.33339593]]
7196 fx_new [6.58337546e-09]
7197 Back to top
7198
7199 xs: [[0.33335201 0.66661715 0.33339024]
7200 [0.33334539 0.66661647 0.33339593]
7201 [0.33333237 0.66663678 0.33341189]
7202 [0.33332887 0.66661743 0.33340189]
7203 [0.33336513 0.66662248 0.33339951]
7204 [0.33334783 0.66662426 0.3334078 ]
7205 [0.33335593 0.66662999 0.33340982]]
7206 fxs: [6.03908054e-09 6.58337546e-09 7.06594983e-09 7.14463428e-09
7207 7.34327165e-09 7.55393186e-09 7.70555467e-09]
7208 Centroid: [0.33334679 0.66662351 0.33340244]
7209 x_new: [[0.33333765 0.66661703 0.33339506]]
7210 fx_new [6.29331988e-09]
7211 Back to top
7212
7213 xs: [[0.33335201 0.66661715 0.33339024]
7214 [0.33333765 0.66661703 0.33339506]
7215 [0.33334539 0.66661647 0.33339593]
7216 [0.33333237 0.66663678 0.33341189]
7217 [0.33332887 0.66661743 0.33340189]
7218 [0.33336513 0.66662248 0.33339951]
7219 [0.33334783 0.66662426 0.3334078 ]]
7220 fxs: [6.03908054e-09 6.29331988e-09 6.58337546e-09 7.06594983e-09
7221 7.14463428e-09 7.34327165e-09 7.55393186e-09]
7222 Centroid: [0.33334418 0.66662166 0.33340033]
7223 x_new: [[0.33334053 0.66661905 0.33339286]]
7224 fx_new [5.86291261e-09]
7225 Expanding
7226
7227 xs: [[0.33333688 0.66661644 0.33338539]
7228 [0.33335201 0.66661715 0.33339024]
7229 [0.33333765 0.66661703 0.33339506]
7230 [0.33334539 0.66661647 0.33339593]
7231 [0.33333237 0.66663678 0.33341189]
7232 [0.33332887 0.66661743 0.33340189]
7233 [0.33336513 0.66662248 0.33339951]]
7234 fxs: [5.24510177e-09 6.03908054e-09 6.29331988e-09 6.58337546e-09
7235 7.06594983e-09 7.14463428e-09 7.34327165e-09]
7236 Centroid: [0.33334262 0.66662054 0.33339713]
7237 x_new: [[0.3333201 0.6666186 0.33339475]]
7238 fx_new [6.25783606e-09]
7239 Back to top
7240
7241 xs: [[0.33333688 0.66661644 0.33338539]
7242 [0.33335201 0.66661715 0.33339024]
7243 [0.3333201 0.6666186 0.33339475]
7244 [0.33333765 0.66661703 0.33339506]
7245 [0.33334539 0.66661647 0.33339593]
7246 [0.33333237 0.66663678 0.33341189]
7247 [0.33332887 0.66661743 0.33340189]]
7248 fxs: [5.24510177e-09 6.03908054e-09 6.25783606e-09 6.29331988e-09
7249 6.58337546e-09 7.06594983e-09 7.14463428e-09]
7250 Centroid: [0.33333618 0.66661999 0.33339645]
7251 x_new: [[0.3333435 0.66662254 0.33339101]]
7252 fx_new [5.37701549e-09]
7253 Back to top
7254
7255 xs: [[0.33333688 0.66661644 0.33338539]
7256 [0.3333435 0.66662254 0.33339101]
7257 [0.33335201 0.66661715 0.33339024]
7258 [0.3333201 0.6666186 0.33339475]
7259 [0.33333765 0.66661703 0.33339506]
7260 [0.33334539 0.66661647 0.33339593]
7261 [0.33333237 0.66663678 0.33341189]]
7262 fxs: [5.24510177e-09 5.37701549e-09 6.03908054e-09 6.25783606e-09

```



```

7263 6.29331988e-09 6.58337546e-09 7.06594983e-09]
7264 Centroid: [0.33333827 0.66662072 0.3333949 ]
7265 x_new: [[0.33334418 0.66660466 0.3333779 ]]
7266 fx_new [5.94936714e-09]
7267 Back to top
7268
7269 xs: [[0.33333688 0.66661644 0.33338539]
7270 [0.3333435 0.66662254 0.33339101]
7271 [0.33334418 0.66660466 0.3333779 ]
7272 [0.33335201 0.66661715 0.33339024]
7273 [0.3333201 0.6666186 0.33339475]
7274 [0.33333765 0.66661703 0.33339506]
7275 [0.33334539 0.66661647 0.33339593]]
7276 fxs: [5.24510177e-09 5.37701549e-09 5.94936714e-09 6.03908054e-09
7277 6.25783606e-09 6.29331988e-09 6.58337546e-09]
7278 Centroid: [0.33333996 0.66661613 0.33339004]
7279 x_new: [[0.33333453 0.66661579 0.33338416]]
7280 fx_new [5.17306438e-09]
7281 Expanding
7282
7283 xs: [[0.33332909 0.66661545 0.33337827]
7284 [0.33333688 0.66661644 0.33338539]
7285 [0.3333435 0.66662254 0.33339101]
7286 [0.33334418 0.66660466 0.3333779 ]
7287 [0.33335201 0.66661715 0.33339024]
7288 [0.3333201 0.6666186 0.33339475]
7289 [0.33333765 0.66661703 0.33339506]]
7290 fxs: [4.66066083e-09 5.24510177e-09 5.37701549e-09 5.94936714e-09
7291 6.03908054e-09 6.25783606e-09 6.29331988e-09]
7292 Centroid: [0.33333763 0.66661598 0.33338752]
7293 x_new: [[0.33333761 0.66661494 0.33337998]]
7294 fx_new [4.86982341e-09]
7295 Back to top
7296
7297 xs: [[0.33332909 0.66661545 0.33337827]
7298 [0.33333761 0.66661494 0.33337998]
7299 [0.33333688 0.66661644 0.33338539]
7300 [0.3333435 0.66662254 0.33339101]
7301 [0.33334418 0.66660466 0.3333779 ]
7302 [0.33335201 0.66661715 0.33339024]
7303 [0.3333201 0.6666186 0.33339475]]
7304 fxs: [4.66066083e-09 4.86982341e-09 5.24510177e-09 5.37701549e-09
7305 5.94936714e-09 6.03908054e-09 6.25783606e-09]
7306 Centroid: [0.33333762 0.66661568 0.33338537]
7307 x_new: [[0.33335515 0.66661276 0.33337598]]
7308 fx_new [5.19973719e-09]
7309 Back to top
7310
7311 xs: [[0.33332909 0.66661545 0.33337827]
7312 [0.33333761 0.66661494 0.33337998]
7313 [0.33335515 0.66661276 0.33337598]
7314 [0.33333688 0.66661644 0.33338539]
7315 [0.3333435 0.66662254 0.33339101]
7316 [0.33334418 0.66660466 0.3333779 ]
7317 [0.33335201 0.66661715 0.33339024]]
7318 fxs: [4.66066083e-09 4.86982341e-09 5.19973719e-09 5.24510177e-09
7319 5.37701549e-09 5.94936714e-09 6.03908054e-09]
7320 Centroid: [0.33334263 0.66661485 0.33338268]
7321 x_new: [[0.33333325 0.66661255 0.33337512]]
7322 fx_new [4.67538087e-09]
7323 Back to top
7324
7325 xs: [[0.33332909 0.66661545 0.33337827]
7326 [0.33333325 0.66661255 0.33337512]
7327 [0.33333761 0.66661494 0.33337998]
7328 [0.33335515 0.66661276 0.33337598]
7329 [0.33333688 0.66661644 0.33338539]
7330 [0.3333435 0.66662254 0.33339101]
7331 [0.33334418 0.66660466 0.3333779 ]]
7332 fxs: [4.66066083e-09 4.67538087e-09 4.86982341e-09 5.19973719e-09

```

```

7333 5.24510177e-09 5.37701549e-09 5.94936714e-09]
7334 Centroid: [0.33333995 0.66661419 0.33338052]
7335 x_new: [[0.33333573 0.66662373 0.33338314]]
7336 fx_new [4.33035971e-09]
7337 Expanding
7338
7339 xs: [[0.3333315 0.66663326 0.33338576]
7340 [0.33332909 0.66661545 0.33337827]
7341 [0.33333325 0.66661255 0.33337512]
7342 [0.33333761 0.66661494 0.33337998]
7343 [0.33335515 0.66661276 0.33337598]
7344 [0.33333688 0.66661644 0.33338539]
7345 [0.3333435 0.66662254 0.33339101]]
7346 fxs: [3.86778680e-09 4.66066083e-09 4.67538087e-09 4.86982341e-09
7347 5.19973719e-09 5.24510177e-09 5.37701549e-09]
7348 Centroid: [0.33333814 0.66661828 0.33338164]
7349 x_new: [[0.33333278 0.66661401 0.33337228]]
7350 fx_new [4.28925812e-09]
7351 Back to top
7352
7353 xs: [[0.3333315 0.66663326 0.33338576]
7354 [0.33333278 0.66661401 0.33337228]
7355 [0.33332909 0.66661545 0.33337827]
7356 [0.33333325 0.66661255 0.33337512]
7357 [0.33333761 0.66661494 0.33337998]
7358 [0.33335515 0.66661276 0.33337598]
7359 [0.33333688 0.66661644 0.33338539]]
7360 fxs: [3.86778680e-09 4.28925812e-09 4.66066083e-09 4.67538087e-09
7361 4.86982341e-09 5.19973719e-09 5.24510177e-09]
7362 Centroid: [0.33333661 0.66661706 0.33337897]
7363 x_new: [[0.33333634 0.66661768 0.33337254]]
7364 fx_new [3.94661393e-09]
7365 Back to top
7366
7367 xs: [[0.3333315 0.66663326 0.33338576]
7368 [0.33333634 0.66661768 0.33337254]
7369 [0.33333278 0.66661401 0.33337228]
7370 [0.33332909 0.66661545 0.33337827]
7371 [0.33333325 0.66661255 0.33337512]
7372 [0.33333761 0.66661494 0.33337998]
7373 [0.33335515 0.66661276 0.33337598]]
7374 fxs: [3.86778680e-09 3.94661393e-09 4.28925812e-09 4.66066083e-09
7375 4.67538087e-09 4.86982341e-09 5.19973719e-09]
7376 Centroid: [0.33333653 0.66661724 0.33337713]
7377 x_new: [[0.33331791 0.66662171 0.33337829]]
7378 fx_new [4.28025268e-09]
7379 Back to top
7380
7381 xs: [[0.3333315 0.66663326 0.33338576]
7382 [0.33333634 0.66661768 0.33337254]
7383 [0.33331791 0.66662171 0.33337829]
7384 [0.33333278 0.66661401 0.33337228]
7385 [0.33332909 0.66661545 0.33337827]
7386 [0.33333325 0.66661255 0.33337512]
7387 [0.33333761 0.66661494 0.33337998]]
7388 fxs: [3.86778680e-09 3.94661393e-09 4.28025268e-09 4.28925812e-09
7389 4.66066083e-09 4.67538087e-09 4.86982341e-09]
7390 Centroid: [0.33333121 0.66661851 0.33337746]
7391 x_new: [[0.33332482 0.66662209 0.33337495]]
7392 fx_new [3.79161606e-09]
7393 Expanding
7394
7395 xs: [[0.33331842 0.66662567 0.33337244]
7396 [0.3333315 0.66663326 0.33338576]
7397 [0.33333634 0.66661768 0.33337254]
7398 [0.33331791 0.66662171 0.33337829]
7399 [0.33333278 0.66661401 0.33337228]
7400 [0.33332909 0.66661545 0.33337827]
7401 [0.33333325 0.66661255 0.33337512]]
7402 fxs: [3.43252363e-09 3.86778680e-09 3.94661393e-09 4.28025268e-09

```

```

7403 4.28925812e-09 4.66066083e-09 4.67538087e-09]
7404 Centroid: [0.33332847 0.66662005 0.33337639]
7405 x_new: [[0.33332369 0.66662755 0.33337765]]
7406 fx_new [3.5873724e-09]
7407 Back to top
7408
7409 xs: [[0.33331842 0.66662567 0.33337244]
7410 [0.33332369 0.66662755 0.33337765]
7411 [0.3333315 0.66663326 0.33338576]
7412 [0.33333634 0.66661768 0.33337254]
7413 [0.33331791 0.66662171 0.33337829]
7414 [0.33333278 0.66661401 0.33337228]
7415 [0.33332909 0.66661545 0.33337827]]
7416 fxs: [3.43252363e-09 3.58737240e-09 3.86778680e-09 3.94661393e-09
7417 4.28025268e-09 4.28925812e-09 4.66066083e-09]
7418 Centroid: [0.33332711 0.66662219 0.33337675]
7419 x_new: [[0.33332512 0.66662893 0.33337522]]
7420 fx_new [3.24640016e-09]
7421 Expanding
7422
7423 xs: [[0.33332313 0.66663567 0.3333737 ]
7424 [0.33331842 0.66662567 0.33337244]
7425 [0.33332369 0.66662755 0.33337765]
7426 [0.3333315 0.66663326 0.33338576]
7427 [0.33333634 0.66661768 0.33337254]
7428 [0.33331791 0.66662171 0.33337829]
7429 [0.33333278 0.66661401 0.33337228]]
7430 fxs: [2.69431335e-09 3.43252363e-09 3.58737240e-09 3.86778680e-09
7431 3.94661393e-09 4.28025268e-09 4.28925812e-09]
7432 Centroid: [0.33332625 0.66662508 0.33337609]
7433 x_new: [[0.33331972 0.66663614 0.33337991]]
7434 fx_new [3.28648408e-09]
7435 Back to top
7436
7437 xs: [[0.33332313 0.66663567 0.3333737 ]
7438 [0.33331972 0.66663614 0.33337991]
7439 [0.33331842 0.66662567 0.33337244]
7440 [0.33332369 0.66662755 0.33337765]
7441 [0.3333315 0.66663326 0.33338576]
7442 [0.33333634 0.66661768 0.33337254]
7443 [0.33331791 0.66662171 0.33337829]]
7444 fxs: [2.69431335e-09 3.28648408e-09 3.43252363e-09 3.58737240e-09
7445 3.86778680e-09 3.94661393e-09 4.28025268e-09]
7446 Centroid: [0.33332439 0.66662824 0.33337718]
7447 x_new: [[0.33333086 0.66663477 0.33337608]]
7448 fx_new [2.85073404e-09]
7449 Back to top
7450
7451 xs: [[0.33332313 0.66663567 0.3333737 ]
7452 [0.33333086 0.66663477 0.33337608]
7453 [0.33331972 0.66663614 0.33337991]
7454 [0.33331842 0.66662567 0.33337244]
7455 [0.33332369 0.66662755 0.33337765]
7456 [0.3333315 0.66663326 0.33338576]
7457 [0.33333634 0.66661768 0.33337254]]
7458 fxs: [2.69431335e-09 2.85073404e-09 3.28648408e-09 3.43252363e-09
7459 3.58737240e-09 3.86778680e-09 3.94661393e-09]
7460 Centroid: [0.33332624 0.6666301 0.33337687]
7461 x_new: [[0.33331614 0.66664253 0.33338119]]
7462 fx_new [3.16858922e-09]
7463 Back to top
7464
7465 xs: [[0.33332313 0.66663567 0.3333737 ]
7466 [0.33333086 0.66663477 0.33337608]
7467 [0.33331614 0.66664253 0.33338119]
7468 [0.33331972 0.66663614 0.33337991]
7469 [0.33331842 0.66662567 0.33337244]
7470 [0.33332369 0.66662755 0.33337765]
7471 [0.3333315 0.66663326 0.33338576]]
7472 fxs: [2.69431335e-09 2.85073404e-09 3.16858922e-09 3.28648408e-09

```

```

7473 3.43252363e-09 3.58737240e-09 3.86778680e-09]
7474 Centroid: [0.33332335 0.66663365 0.3333781 ]
7475 x_new: [[0.33331521 0.66663405 0.33337045]]
7476 fx_new [2.770096e-09]
7477 Back to top
7478
7479 xs: [[0.33332313 0.66663567 0.3333737 ]
7480 [0.33331521 0.66663405 0.33337045]
7481 [0.33333086 0.66663477 0.33337608]
7482 [0.33331614 0.66664253 0.33338119]
7483 [0.33331972 0.66663614 0.33337991]
7484 [0.33331842 0.66662567 0.33337244]
7485 [0.33332369 0.66662755 0.33337765]]
7486 fxs: [2.69431335e-09 2.77009600e-09 2.85073404e-09 3.16858922e-09
7487 3.28648408e-09 3.43252363e-09 3.58737240e-09]
7488 Centroid: [0.33332103 0.66663377 0.33337592]
7489 x_new: [[0.33331836 0.66663999 0.33337418]]
7490 fx_new [2.60463555e-09]
7491 Expanding
7492
7493 xs: [[0.33331569 0.66664621 0.33337245]
7494 [0.33332313 0.66663567 0.3333737 ]
7495 [0.33331521 0.66663405 0.33337045]
7496 [0.33333086 0.66663477 0.33337608]
7497 [0.33331614 0.66664253 0.33338119]
7498 [0.33331972 0.66663614 0.33337991]
7499 [0.33331842 0.66662567 0.33337244]]
7500 fxs: [2.25969246e-09 2.69431335e-09 2.77009600e-09 2.85073404e-09
7501 3.16858922e-09 3.28648408e-09 3.43252363e-09]
7502 Centroid: [0.33331988 0.66663643 0.33337517]
7503 x_new: [[0.33332134 0.6666472 0.33337791]]
7504 fx_new [2.50964049e-09]
7505 Back to top
7506
7507 xs: [[0.33331569 0.66664621 0.33337245]
7508 [0.33332134 0.6666472 0.33337791]
7509 [0.33332313 0.66663567 0.3333737 ]
7510 [0.33331521 0.66663405 0.33337045]
7511 [0.33333086 0.66663477 0.33337608]
7512 [0.33331614 0.66664253 0.33338119]
7513 [0.33331972 0.66663614 0.33337991]]
7514 fxs: [2.25969246e-09 2.50964049e-09 2.69431335e-09 2.77009600e-09
7515 2.85073404e-09 3.16858922e-09 3.28648408e-09]
7516 Centroid: [0.3333203 0.66663951 0.33337595]
7517 x_new: [[0.33332088 0.66664288 0.333372 ]]
7518 fx_new [2.21612565e-09]
7519 Expanding
7520
7521 xs: [[0.33332145 0.66664624 0.33336804]
7522 [0.33331569 0.66664621 0.33337245]
7523 [0.33332134 0.6666472 0.33337791]
7524 [0.33332313 0.66663567 0.3333737 ]
7525 [0.33331521 0.66663405 0.33337045]
7526 [0.33333086 0.66663477 0.33337608]
7527 [0.33331614 0.66664253 0.33338119]]
7528 fxs: [1.76292407e-09 2.25969246e-09 2.50964049e-09 2.69431335e-09
7529 2.77009600e-09 2.85073404e-09 3.16858922e-09]
7530 Centroid: [0.33332055 0.66664095 0.33337426]
7531 x_new: [[0.33332495 0.66663937 0.33336732]]
7532 fx_new [1.97067753e-09]
7533 Back to top
7534
7535 xs: [[0.33332145 0.66664624 0.33336804]
7536 [0.33332495 0.66663937 0.33336732]
7537 [0.33331569 0.66664621 0.33337245]
7538 [0.33332134 0.6666472 0.33337791]
7539 [0.33332313 0.66663567 0.3333737 ]
7540 [0.33331521 0.66663405 0.33337045]
7541 [0.33333086 0.66663477 0.33337608]]
7542 fxs: [1.76292407e-09 1.97067753e-09 2.25969246e-09 2.50964049e-09

```

```

7543 2.69431335e-09 2.77009600e-09 2.85073404e-09]
7544 Centroid: [0.33332181 0.6666405 0.33337228]
7545 x_new: [[0.33331275 0.66664623 0.33336848]]
7546 fx_new [2.07636714e-09]
7547 Back to top
7548
7549 xs: [[0.33332145 0.66664624 0.33336804]
7550 [0.33332495 0.66663937 0.33336732]
7551 [0.33331275 0.66664623 0.33336848]
7552 [0.33331569 0.66664621 0.33337245]
7553 [0.33332134 0.6666472 0.33337791]
7554 [0.33332313 0.66663567 0.3333737 ]
7555 [0.33331521 0.66663405 0.33337045]]
7556 fxs: [1.76292407e-09 1.97067753e-09 2.07636714e-09 2.25969246e-09
7557 2.50964049e-09 2.69431335e-09 2.77009600e-09]
7558 Centroid: [0.33331922 0.66664214 0.33337119]
7559 x_new: [[0.33332323 0.66665023 0.33337194]]
7560 fx_new [1.86244322e-09]
7561 Back to top
7562
7563 xs: [[0.33332145 0.66664624 0.33336804]
7564 [0.33332323 0.66665023 0.33337194]
7565 [0.33332495 0.66663937 0.33336732]
7566 [0.33331275 0.66664623 0.33336848]
7567 [0.33331569 0.66664621 0.33337245]
7568 [0.33332134 0.6666472 0.33337791]
7569 [0.33332313 0.66663567 0.3333737 ]]
7570 fxs: [1.76292407e-09 1.86244322e-09 1.97067753e-09 2.07636714e-09
7571 2.25969246e-09 2.50964049e-09 2.69431335e-09]
7572 Centroid: [0.33332036 0.66664445 0.3333714 ]
7573 x_new: [[0.3333176 0.66665323 0.33336911]]
7574 fx_new [1.70818082e-09]
7575 Expanding
7576
7577 xs: [[0.33331483 0.66666202 0.33336682]
7578 [0.33332145 0.66664624 0.33336804]
7579 [0.33332323 0.66665023 0.33337194]
7580 [0.33332495 0.66663937 0.33336732]
7581 [0.33331275 0.66664623 0.33336848]
7582 [0.33331569 0.66664621 0.33337245]
7583 [0.33332134 0.6666472 0.33337791]]
7584 fxs: [1.48528016e-09 1.76292407e-09 1.86244322e-09 1.97067753e-09
7585 2.07636714e-09 2.25969246e-09 2.50964049e-09]
7586 Centroid: [0.33331918 0.66664821 0.33337042]
7587 x_new: [[0.33331701 0.66664923 0.33336294]]
7588 fx_new [1.44670773e-09]
7589 Expanding
7590
7591 xs: [[0.33331485 0.66665025 0.33335545]
7592 [0.33331483 0.66666202 0.33336682]
7593 [0.33332145 0.66664624 0.33336804]
7594 [0.33332323 0.66665023 0.33337194]
7595 [0.33332495 0.66663937 0.33336732]
7596 [0.33331275 0.66664623 0.33336848]
7597 [0.33331569 0.66664621 0.33337245]]
7598 fxs: [1.10050811e-09 1.48528016e-09 1.76292407e-09 1.86244322e-09
7599 1.97067753e-09 2.07636714e-09 2.25969246e-09]
7600 Centroid: [0.33331825 0.66664865 0.33336721]
7601 x_new: [[0.33332081 0.66665109 0.33336198]]
7602 fx_new [1.22008599e-09]
7603 Back to top
7604
7605 xs: [[0.33331485 0.66665025 0.33335545]
7606 [0.33332081 0.66665109 0.33336198]
7607 [0.33331483 0.66666202 0.33336682]
7608 [0.33332145 0.66664624 0.33336804]
7609 [0.33332323 0.66665023 0.33337194]
7610 [0.33332495 0.66663937 0.33336732]
7611 [0.33331275 0.66664623 0.33336848]]
7612 fxs: [1.10050811e-09 1.22008599e-09 1.48528016e-09 1.76292407e-09

```

```

7613 1.86244322e-09 1.97067753e-09 2.07636714e-09]
7614 Centroid: [0.33331898 0.66664935 0.33336572]
7615 x_new: [[0.33332522 0.66665246 0.33336296]]
7616 fx_new [1.1454346e-09]
7617 Back to top
7618
7619 xs: [[0.33331485 0.66665025 0.33335545]
7620 [0.33332522 0.66665246 0.33336296]
7621 [0.33332081 0.66665109 0.33336198]
7622 [0.33331483 0.66666202 0.33336682]
7623 [0.33332145 0.66664624 0.33336804]
7624 [0.33332323 0.66665023 0.33337194]
7625 [0.33332495 0.66663937 0.33336732]]
7626 fxs: [1.10050811e-09 1.14543460e-09 1.22008599e-09 1.48528016e-09
7627 1.76292407e-09 1.86244322e-09 1.97067753e-09]
7628 Centroid: [0.33332076 0.66665024 0.33336493]
7629 x_new: [[0.33331657 0.6666611 0.33336254]]
7630 fx_new [1.1647047e-09]
7631 Back to top
7632
7633 xs: [[0.33331485 0.66665025 0.33335545]
7634 [0.33332522 0.66665246 0.33336296]
7635 [0.33331657 0.6666611 0.33336254]
7636 [0.33332081 0.66665109 0.33336198]
7637 [0.33331483 0.66666202 0.33336682]
7638 [0.33332145 0.66664624 0.33336804]
7639 [0.33332323 0.66665023 0.33337194]]
7640 fxs: [1.10050811e-09 1.14543460e-09 1.16470470e-09 1.22008599e-09
7641 1.48528016e-09 1.76292407e-09 1.86244322e-09]
7642 Centroid: [0.33331957 0.66665334 0.33336425]
7643 x_new: [[0.3333159 0.66665645 0.33335656]]
7644 fx_new [9.47490745e-10]
7645 Expanding
7646
7647 xs: [[0.33331224 0.66665957 0.33334887]
7648 [0.33331485 0.66665025 0.33335545]
7649 [0.33332522 0.66665246 0.33336296]
7650 [0.33331657 0.6666611 0.33336254]
7651 [0.33332081 0.66665109 0.33336198]
7652 [0.33331483 0.66666202 0.33336682]
7653 [0.33332145 0.66664624 0.33336804]]
7654 fxs: [7.36732146e-10 1.10050811e-09 1.14543460e-09 1.16470470e-09
7655 1.22008599e-09 1.48528016e-09 1.76292407e-09]
7656 Centroid: [0.333318 0.66665468 0.33336095]
7657 x_new: [[0.33331454 0.66666311 0.33335386]]
7658 fx_new [7.87264162e-10]
7659 Back to top
7660
7661 xs: [[0.33331224 0.66665957 0.33334887]
7662 [0.33331454 0.66666311 0.33335386]
7663 [0.33331485 0.66665025 0.33335545]
7664 [0.33332522 0.66665246 0.33336296]
7665 [0.33331657 0.6666611 0.33336254]
7666 [0.33332081 0.66665109 0.33336198]
7667 [0.33331483 0.66666202 0.33336682]]
7668 fxs: [7.36732146e-10 7.87264162e-10 1.10050811e-09 1.14543460e-09
7669 1.16470470e-09 1.22008599e-09 1.48528016e-09]
7670 Centroid: [0.33331701 0.66665709 0.33335893]
7671 x_new: [[0.33331918 0.66665215 0.33335103]]
7672 fx_new [7.24022717e-10]
7673 Expanding
7674
7675 xs: [[0.33332136 0.66664722 0.33334314]
7676 [0.33331224 0.66665957 0.33334887]
7677 [0.33331454 0.66666311 0.33335386]
7678 [0.33331485 0.66665025 0.33335545]
7679 [0.33332522 0.66665246 0.33336296]
7680 [0.33331657 0.6666611 0.33336254]
7681 [0.33332081 0.66665109 0.33336198]]
7682 fxs: [6.17522824e-10 7.36732146e-10 7.87264162e-10 1.10050811e-09

```

```

7683 1.14543460e-09 1.16470470e-09 1.22008599e-09]
7684 Centroid: [0.33331794 0.66665497 0.33335554]
7685 x_new: [[0.33331507 0.66665885 0.3333491 ]]
7686 fx_new [6.43271878e-10]
7687 Back to top
7688
7689 xs: [[0.33332136 0.66664722 0.33334314]
7690 [0.33331507 0.66665885 0.3333491 ]
7691 [0.33331224 0.66665957 0.33334887]
7692 [0.33331454 0.66666311 0.33335386]
7693 [0.33331485 0.66665025 0.33335545]
7694 [0.33332522 0.66665246 0.33336296]
7695 [0.33331657 0.6666611 0.33336254]]
7696 fxs: [6.17522824e-10 6.43271878e-10 7.36732146e-10 7.87264162e-10
7697 1.10050811e-09 1.14543460e-09 1.16470470e-09]
7698 Centroid: [0.33331712 0.66665608 0.3333537 ]
7699 x_new: [[0.33331767 0.66665106 0.33334487]]
7700 fx_new [6.22091113e-10]
7701 Back to top
7702
7703 xs: [[0.33332136 0.66664722 0.33334314]
7704 [0.33331767 0.66665106 0.33334487]
7705 [0.33331507 0.66665885 0.3333491 ]
7706 [0.33331224 0.66665957 0.33334887]
7707 [0.33331454 0.66666311 0.33335386]
7708 [0.33331485 0.66665025 0.33335545]
7709 [0.33332522 0.66665246 0.33336296]]
7710 fxs: [6.17522824e-10 6.22091113e-10 6.43271878e-10 7.36732146e-10
7711 7.87264162e-10 1.10050811e-09 1.14543460e-09]
7712 Centroid: [0.33331728 0.66665464 0.33335118]
7713 x_new: [[0.33330934 0.66665683 0.3333394 ]]
7714 fx_new [7.09291933e-10]
7715 Back to top
7716
7717 xs: [[0.33332136 0.66664722 0.33334314]
7718 [0.33331767 0.66665106 0.33334487]
7719 [0.33331507 0.66665885 0.3333491 ]
7720 [0.33330934 0.66665683 0.3333394 ]
7721 [0.33331224 0.66665957 0.33334887]
7722 [0.33331454 0.66666311 0.33335386]
7723 [0.33331485 0.66665025 0.33335545]]
7724 fxs: [6.17522824e-10 6.22091113e-10 6.43271878e-10 7.09291933e-10
7725 7.36732146e-10 7.87264162e-10 1.10050811e-09]
7726 Centroid: [0.33331501 0.66665527 0.33334781]
7727 x_new: [[0.33331517 0.66666029 0.33334017]]
7728 fx_new [4.17333827e-10]
7729 Expanding
7730
7731 xs: [[0.33331533 0.66666531 0.33333253]
7732 [0.33332136 0.66664722 0.33334314]
7733 [0.33331767 0.66665106 0.33334487]
7734 [0.33331507 0.66665885 0.3333491 ]
7735 [0.33330934 0.66665683 0.3333394 ]
7736 [0.33331224 0.66665957 0.33334887]
7737 [0.33331454 0.66666311 0.33335386]]
7738 fxs: [3.26565202e-10 6.17522824e-10 6.22091113e-10 6.43271878e-10
7739 7.09291933e-10 7.36732146e-10 7.87264162e-10]
7740 Centroid: [0.33331508 0.66665742 0.33334454]
7741 x_new: [[0.33331562 0.66665173 0.33333522]]
7742 fx_new [5.40363779e-10]
7743 Back to top
7744
7745 xs: [[0.33331533 0.66666531 0.33333253]
7746 [0.33331562 0.66665173 0.33333522]
7747 [0.33332136 0.66664722 0.33334314]
7748 [0.33331767 0.66665106 0.33334487]
7749 [0.33331507 0.66665885 0.3333491 ]
7750 [0.33330934 0.66665683 0.3333394 ]
7751 [0.33331224 0.66665957 0.33334887]]
7752 fxs: [3.26565202e-10 5.40363779e-10 6.17522824e-10 6.22091113e-10

```

```

7753 6.43271878e-10 7.09291933e-10 7.36732146e-10]
7754 Centroid: [0.33331523 0.6666558 0.33334187]
7755 x_new: [[0.33331823 0.66665203 0.33333488]]
7756 fx_new [4.44997784e-10]
7757 Back to top
7758
7759 xs: [[0.33331533 0.66666531 0.33333253]
7760 [0.33331823 0.66665203 0.33333488]
7761 [0.33331562 0.66665173 0.33333522]
7762 [0.33332136 0.66664722 0.33334314]
7763 [0.33331767 0.66665106 0.33334487]
7764 [0.33331507 0.66665885 0.3333491 ]
7765 [0.33330934 0.66665683 0.3333394 ]]
7766 fxs: [3.26565202e-10 4.44997784e-10 5.40363779e-10 6.17522824e-10
7767 6.22091113e-10 6.43271878e-10 7.09291933e-10]
7768 Centroid: [0.33331609 0.66665472 0.33333988]
7769 x_new: [[0.33332284 0.66665261 0.33334036]]
7770 fx_new [3.57092593e-10]
7771 Back to top
7772
7773 xs: [[0.33331533 0.66666531 0.33333253]
7774 [0.33332284 0.66665261 0.33334036]
7775 [0.33331823 0.66665203 0.33333488]
7776 [0.33331562 0.66665173 0.33333522]
7777 [0.33332136 0.66664722 0.33334314]
7778 [0.33331767 0.66665106 0.33334487]
7779 [0.33331507 0.66665885 0.3333491 ]]
7780 fxs: [3.26565202e-10 3.57092593e-10 4.44997784e-10 5.40363779e-10
7781 6.17522824e-10 6.22091113e-10 6.43271878e-10]
7782 Centroid: [0.33331802 0.66665412 0.33334001]
7783 x_new: [[0.33332096 0.66664938 0.33333092]]
7784 fx_new [4.57671005e-10]
7785 Back to top
7786
7787 xs: [[0.33331533 0.66666531 0.33333253]
7788 [0.33332284 0.66665261 0.33334036]
7789 [0.33331823 0.66665203 0.33333488]
7790 [0.33332096 0.66664938 0.33333092]
7791 [0.33331562 0.66665173 0.33333522]
7792 [0.33332136 0.66664722 0.33334314]
7793 [0.33331767 0.66665106 0.33334487]]
7794 fxs: [3.26565202e-10 3.57092593e-10 4.44997784e-10 4.57671005e-10
7795 5.40363779e-10 6.17522824e-10 6.22091113e-10]
7796 Centroid: [0.33331886 0.66665276 0.33333742]
7797 x_new: [[0.33332005 0.66665447 0.33332997]]
7798 fx_new [3.36659712e-10]
7799 Back to top
7800
7801 xs: [[0.33331533 0.66666531 0.33333253]
7802 [0.33332005 0.66665447 0.33332997]
7803 [0.33332284 0.66665261 0.33334036]
7804 [0.33331823 0.66665203 0.33333488]
7805 [0.33332096 0.66664938 0.33333092]
7806 [0.33331562 0.66665173 0.33333522]
7807 [0.33332136 0.66664722 0.33334314]]
7808 fxs: [3.26565202e-10 3.36659712e-10 3.57092593e-10 4.44997784e-10
7809 4.57671005e-10 5.40363779e-10 6.17522824e-10]
7810 Centroid: [0.3333192 0.66665325 0.33333529]
7811 x_new: [[0.33331703 0.66665928 0.33332744]]
7812 fx_new [3.55012701e-10]
7813 Back to top
7814
7815 xs: [[0.33331533 0.66666531 0.33333253]
7816 [0.33332005 0.66665447 0.33332997]
7817 [0.33331703 0.66665928 0.33332744]
7818 [0.33332284 0.66665261 0.33334036]
7819 [0.33331823 0.66665203 0.33333488]
7820 [0.33332096 0.66664938 0.33333092]
7821 [0.33331562 0.66665173 0.33333522]]
7822 fxs: [3.26565202e-10 3.36659712e-10 3.55012701e-10 3.57092593e-10

```



```

7823 4.44997784e-10 4.57671005e-10 5.40363779e-10]
7824 Centroid: [0.33331858 0.66665497 0.33333305]
7825 x_new: [[0.33332154 0.66665821 0.33333087]]
7826 fx_new [2.1660482e-10]
7827 Expanding
7828
7829 xs: [[0.3333245 0.66666145 0.3333287 ]
7830 [0.33331533 0.66666531 0.33333253]
7831 [0.33332005 0.66665447 0.33332997]
7832 [0.33331703 0.66665928 0.33332744]
7833 [0.33332284 0.66665261 0.33334036]
7834 [0.33331823 0.66665203 0.33333488]
7835 [0.33332096 0.66664938 0.33333092]]
7836 fxs: [1.26639914e-10 3.26565202e-10 3.36659712e-10 3.55012701e-10
7837 3.57092593e-10 4.44997784e-10 4.57671005e-10]
7838 Centroid: [0.33331985 0.66665636 0.33333211]
7839 x_new: [[0.33331873 0.66666334 0.33333331]]
7840 fx_new [2.24173667e-10]
7841 Back to top
7842
7843 xs: [[0.3333245 0.66666145 0.3333287 ]
7844 [0.33331873 0.66666334 0.33333331]
7845 [0.33331533 0.66666531 0.33333253]
7846 [0.33332005 0.66665447 0.33332997]
7847 [0.33331703 0.66665928 0.33332744]
7848 [0.33332284 0.66665261 0.33334036]
7849 [0.33331823 0.66665203 0.33333488]]
7850 fxs: [1.26639914e-10 2.24173667e-10 3.26565202e-10 3.36659712e-10
7851 3.55012701e-10 3.57092593e-10 4.44997784e-10]
7852 Centroid: [0.33331953 0.66665836 0.33333246]
7853 x_new: [[0.33332083 0.66666469 0.33333003]]
7854 fx_new [1.71092882e-10]
7855 Back to top
7856
7857 xs: [[0.3333245 0.66666145 0.3333287 ]
7858 [0.33332083 0.66666469 0.33333003]
7859 [0.33331873 0.66666334 0.33333331]
7860 [0.33331533 0.66666531 0.33333253]
7861 [0.33332005 0.66665447 0.33332997]
7862 [0.33331703 0.66665928 0.33332744]
7863 [0.33332284 0.66665261 0.33334036]]
7864 fxs: [1.26639914e-10 1.71092882e-10 2.24173667e-10 3.26565202e-10
7865 3.36659712e-10 3.55012701e-10 3.57092593e-10]
7866 Centroid: [0.3333199 0.66666017 0.33333176]
7867 x_new: [[0.33331697 0.66666772 0.33332317]]
7868 fx_new [3.72297367e-10]
7869 Contracting
7870
7871 xs: [[0.3333245 0.66666145 0.3333287 ]
7872 [0.33332083 0.66666469 0.33333003]
7873 [0.33331873 0.66666334 0.33333331]
7874 [0.33332078 0.6666579 0.33333434]
7875 [0.33331533 0.66666531 0.33333253]
7876 [0.33332005 0.66665447 0.33332997]
7877 [0.33331703 0.66665928 0.33332744]]
7878 fxs: [1.26639914e-10 1.71092882e-10 2.24173667e-10 2.35418007e-10
7879 3.26565202e-10 3.36659712e-10 3.55012701e-10]
7880 Centroid: [0.33331961 0.66666092 0.3333309 ]
7881 x_new: [[0.33332218 0.66666256 0.33333437]]
7882 fx_new [1.42224155e-10]
7883 Back to top
7884
7885 xs: [[0.3333245 0.66666145 0.3333287 ]
7886 [0.33332218 0.66666256 0.33333437]
7887 [0.33332083 0.66666469 0.33333003]
7888 [0.33331873 0.66666334 0.33333331]
7889 [0.33332078 0.6666579 0.33333434]
7890 [0.33331533 0.66666531 0.33333253]
7891 [0.33332005 0.66665447 0.33332997]]
7892 fxs: [1.26639914e-10 1.42224155e-10 1.71092882e-10 2.24173667e-10

```

```

7893 2.35418007e-10 3.26565202e-10 3.36659712e-10]
7894 Centroid: [0.33332034 0.66666139 0.33333189]
7895 x_new: [[0.33332064 0.66666831 0.33333382]]
7896 fx_new [1.63971702e-10]
7897 Back to top
7898
7899 xs: [[0.3333245 0.66666145 0.3333287 ]
7900 [0.33332218 0.66666256 0.33333437]
7901 [0.33332064 0.66666831 0.33333382]
7902 [0.33332083 0.66666469 0.33333003]
7903 [0.33331873 0.66666334 0.33333331]
7904 [0.33332078 0.6666579 0.33333434]
7905 [0.33331533 0.66666531 0.33333253]]
7906 fxs: [1.26639914e-10 1.42224155e-10 1.63971702e-10 1.71092882e-10
7907 2.24173667e-10 2.35418007e-10 3.26565202e-10]
7908 Centroid: [0.33332043 0.66666337 0.33333244]
7909 x_new: [[0.33332553 0.66666142 0.33333235]]
7910 fx_new [8.94134742e-11]
7911 Expanding
7912
7913 xs: [[0.33333063 0.66665947 0.33333226]
7914 [0.3333245 0.66666145 0.3333287 ]
7915 [0.33332218 0.66666256 0.33333437]
7916 [0.33332064 0.66666831 0.33333382]
7917 [0.33332083 0.66666469 0.33333003]
7918 [0.33331873 0.66666334 0.33333331]
7919 [0.33332078 0.6666579 0.33333434]]
7920 fxs: [6.02482439e-11 1.26639914e-10 1.42224155e-10 1.63971702e-10
7921 1.71092882e-10 2.24173667e-10 2.35418007e-10]
7922 Centroid: [0.33332262 0.66666253 0.3333324 ]
7923 x_new: [[0.33332445 0.66666716 0.33333047]]
7924 fx_new [8.74157892e-11]
7925 Back to top
7926
7927 xs: [[0.33333063 0.66665947 0.33333226]
7928 [0.33332445 0.66666716 0.33333047]
7929 [0.3333245 0.66666145 0.3333287 ]
7930 [0.33332218 0.66666256 0.33333437]
7931 [0.33332064 0.66666831 0.33333382]
7932 [0.33332083 0.66666469 0.33333003]
7933 [0.33331873 0.66666334 0.33333331]]
7934 fxs: [6.02482439e-11 8.74157892e-11 1.26639914e-10 1.42224155e-10
7935 1.63971702e-10 1.71092882e-10 2.24173667e-10]
7936 Centroid: [0.33332314 0.66666386 0.33333185]
7937 x_new: [[0.33332754 0.66666437 0.33333039]]
7938 fx_new [4.74462621e-11]
7939 Expanding
7940
7941 xs: [[0.33333195 0.66666488 0.33332894]
7942 [0.33333063 0.66665947 0.33333226]
7943 [0.33332445 0.66666716 0.33333047]
7944 [0.3333245 0.66666145 0.3333287 ]
7945 [0.33332218 0.66666256 0.33333437]
7946 [0.33332064 0.66666831 0.33333382]
7947 [0.33332083 0.66666469 0.33333003]]
7948 fxs: [2.44189051e-11 6.02482439e-11 8.74157892e-11 1.26639914e-10
7949 1.42224155e-10 1.63971702e-10 1.71092882e-10]
7950 Centroid: [0.33332503 0.66666408 0.33333123]
7951 x_new: [[0.33332922 0.66666346 0.33333242]]
7952 fx_new [2.80135442e-11]
7953 Back to top
7954
7955 xs: [[0.33333195 0.66666488 0.33332894]
7956 [0.33332922 0.66666346 0.33333242]
7957 [0.33333063 0.66665947 0.33333226]
7958 [0.33332445 0.66666716 0.33333047]
7959 [0.3333245 0.66666145 0.3333287 ]
7960 [0.33332218 0.66666256 0.33333437]
7961 [0.33332064 0.66666831 0.33333382]]
7962 fxs: [2.44189051e-11 2.80135442e-11 6.02482439e-11 8.74157892e-11

```

```

7963 1.26639914e-10 1.42224155e-10 1.63971702e-10]
7964 Centroid: [0.33332622 0.6666639 0.33333157]
7965 x_new: [[0.33333181 0.66665949 0.33332932]]
7966 fx_new [6.99391239e-11]
7967 Back to top
7968
7969 xs: [[0.33333195 0.66666488 0.33332894]
7970 [0.33332922 0.66666346 0.33333242]
7971 [0.33333063 0.66665947 0.33333226]
7972 [0.33333181 0.66665949 0.33332932]
7973 [0.33332445 0.66666716 0.33333047]
7974 [0.3333245 0.66666145 0.3333287 ]
7975 [0.33332218 0.66666256 0.33333437]]
7976 fxs: [2.44189051e-11 2.80135442e-11 6.02482439e-11 6.99391239e-11
7977 8.74157892e-11 1.26639914e-10 1.42224155e-10]
7978 Centroid: [0.33332782 0.66666264 0.33333093]
7979 x_new: [[0.33333345 0.66666272 0.33332748]]
7980 fx_new [4.98072396e-11]
7981 Back to top
7982
7983 xs: [[0.33333195 0.66666488 0.33332894]
7984 [0.33332922 0.66666346 0.33333242]
7985 [0.33333345 0.66666272 0.33332748]
7986 [0.33333063 0.66665947 0.33333226]
7987 [0.33333181 0.66665949 0.33332932]
7988 [0.33332445 0.66666716 0.33333047]
7989 [0.3333245 0.66666145 0.3333287 ]]
7990 fxs: [2.44189051e-11 2.80135442e-11 4.98072396e-11 6.02482439e-11
7991 6.99391239e-11 8.74157892e-11 1.26639914e-10]
7992 Centroid: [0.33332943 0.66666266 0.33332994]
7993 x_new: [[0.33333436 0.66666388 0.33333118]]
7994 fx_new [1.34796685e-11]
7995 Expanding
7996
7997 xs: [[0.33333436 0.66666388 0.33333118]
7998 [0.33333195 0.66666488 0.33332894]
7999 [0.33332922 0.66666346 0.33333242]
8000 [0.33333345 0.66666272 0.33332748]
8001 [0.33333063 0.66665947 0.33333226]
8002 [0.33333181 0.66665949 0.33332932]
8003 [0.33332445 0.66666716 0.33333047]]
8004 fxs: [1.34796685e-11 2.44189051e-11 2.80135442e-11 4.98072396e-11
8005 6.02482439e-11 6.99391239e-11 8.74157892e-11]
8006 Centroid: [0.33333084 0.66666301 0.3333303 ]
8007 x_new: [[0.33333723 0.66665885 0.33333012]]
8008 fx_new [8.64796128e-11]
8009 Back to top
8010
8011 xs: [[0.33333436 0.66666388 0.33333118]
8012 [0.33333195 0.66666488 0.33332894]
8013 [0.33332922 0.66666346 0.33333242]
8014 [0.33333345 0.66666272 0.33332748]
8015 [0.33333063 0.66665947 0.33333226]
8016 [0.33333181 0.66665949 0.33332932]
8017 [0.33333723 0.66665885 0.33333012]]
8018 fxs: [1.34796685e-11 2.44189051e-11 2.80135442e-11 4.98072396e-11
8019 6.02482439e-11 6.99391239e-11 8.64796128e-11]
8020 Centroid: [0.33333266 0.66666182 0.33333025]
8021 x_new: [[0.3333281 0.66666479 0.33333037]]
8022 fx_new [3.97076223e-11]
8023 Back to top
8024
8025 xs: [[0.33333436 0.66666388 0.33333118]
8026 [0.33333195 0.66666488 0.33332894]
8027 [0.33332922 0.66666346 0.33333242]
8028 [0.3333281 0.66666479 0.33333037]
8029 [0.33333345 0.66666272 0.33332748]
8030 [0.33333063 0.66665947 0.33333226]
8031 [0.33333181 0.66665949 0.33332932]]
8032 fxs: [1.34796685e-11 2.44189051e-11 2.80135442e-11 3.97076223e-11

```

```

8033 4.98072396e-11 6.02482439e-11 6.99391239e-11]
8034 Centroid: [0.33333136 0.66666267 0.33333028]
8035 x_new: [[0.33333091 0.66666585 0.33333125]]
8036 fx_new [1.08896517e-11]
8037 Expanding
8038
8039 xs: [[0.33333091 0.66666585 0.33333125]
8040 [0.33333436 0.66666388 0.33333118]
8041 [0.33333195 0.66666488 0.33332894]
8042 [0.33332922 0.66666346 0.33333242]
8043 [0.3333281 0.66666479 0.33333037]
8044 [0.33333345 0.66666272 0.33332748]
8045 [0.33333063 0.66665947 0.33333226]]
8046 fxs: [1.08896517e-11 1.34796685e-11 2.44189051e-11 2.80135442e-11
8047 3.97076223e-11 4.98072396e-11 6.02482439e-11]
8048 Centroid: [0.33333123 0.66666358 0.33333056]
8049 x_new: [[0.33333183 0.66666769 0.33332885]]
8050 fx_new [2.33452779e-11]
8051 Back to top
8052
8053 xs: [[0.33333091 0.66666585 0.33333125]
8054 [0.33333436 0.66666388 0.33333118]
8055 [0.33333183 0.66666769 0.33332885]
8056 [0.33333195 0.66666488 0.33332894]
8057 [0.33332922 0.66666346 0.33333242]
8058 [0.3333281 0.66666479 0.33333037]
8059 [0.33333345 0.66666272 0.33332748]]
8060 fxs: [1.08896517e-11 1.34796685e-11 2.33452779e-11 2.44189051e-11
8061 2.80135442e-11 3.97076223e-11 4.98072396e-11]
8062 Centroid: [0.3333314 0.66666475 0.33333007]
8063 x_new: [[0.33332935 0.66666678 0.33333266]]
8064 fx_new [1.63171911e-11]
8065 Back to top
8066
8067 xs: [[0.33333091 0.66666585 0.33333125]
8068 [0.33333436 0.66666388 0.33333118]
8069 [0.33332935 0.66666678 0.33333266]
8070 [0.33333183 0.66666769 0.33332885]
8071 [0.33333195 0.66666488 0.33332894]
8072 [0.33332922 0.66666346 0.33333242]
8073 [0.3333281 0.66666479 0.33333037]]
8074 fxs: [1.08896517e-11 1.34796685e-11 1.63171911e-11 2.33452779e-11
8075 2.44189051e-11 2.80135442e-11 3.97076223e-11]
8076 Centroid: [0.33333082 0.66666533 0.33333081]
8077 x_new: [[0.33333354 0.66666588 0.33333125]]
8078 fx_new [5.00397718e-12]
8079 Expanding
8080
8081 xs: [[0.33333354 0.66666588 0.33333125]
8082 [0.33333091 0.66666585 0.33333125]
8083 [0.33333436 0.66666388 0.33333118]
8084 [0.33332935 0.66666678 0.33333266]
8085 [0.33333183 0.66666769 0.33332885]
8086 [0.33333195 0.66666488 0.33332894]
8087 [0.33332922 0.66666346 0.33333242]]
8088 fxs: [5.00397718e-12 1.08896517e-11 1.34796685e-11 1.63171911e-11
8089 2.33452779e-11 2.44189051e-11 2.80135442e-11]
8090 Centroid: [0.33333159 0.66666549 0.33333094]
8091 x_new: [[0.33333397 0.66666751 0.33332945]]
8092 fx_new [1.62096559e-11]
8093 Back to top
8094
8095 xs: [[0.33333354 0.66666588 0.33333125]
8096 [0.33333091 0.66666585 0.33333125]
8097 [0.33333436 0.66666388 0.33333118]
8098 [0.33333397 0.66666751 0.33332945]
8099 [0.33332935 0.66666678 0.33333266]
8100 [0.33333183 0.66666769 0.33332885]
8101 [0.33333195 0.66666488 0.33332894]]
8102 fxs: [5.00397718e-12 1.08896517e-11 1.34796685e-11 1.62096559e-11

```

```

8103 1.63171911e-11 2.33452779e-11 2.44189051e-11]
8104 Centroid: [0.33333227 0.66666607 0.33333051]
8105 x_new: [[0.3333326 0.66666725 0.33333208]]
8106 fx_new [2.44578903e-12]
8107 Expanding
8108
8109 xs: [[0.3333326 0.66666725 0.33333208]
8110 [0.33333354 0.66666588 0.33333125]
8111 [0.33333091 0.66666585 0.33333125]
8112 [0.33333436 0.66666388 0.33333118]
8113 [0.33333397 0.66666751 0.33332945]
8114 [0.33332935 0.66666678 0.33333266]
8115 [0.33333183 0.66666769 0.33332885]]
8116 fxs: [2.44578903e-12 5.00397718e-12 1.08896517e-11 1.34796685e-11
8117 1.62096559e-11 1.63171911e-11 2.33452779e-11]
8118 Centroid: [0.33333237 0.6666664 0.33333096]
8119 x_new: [[0.3333329 0.66666512 0.33333307]]
8120 fx_new [2.64449602e-12]
8121 Back to top
8122
8123 xs: [[0.3333326 0.66666725 0.33333208]
8124 [0.3333329 0.66666512 0.33333307]
8125 [0.33333354 0.66666588 0.33333125]
8126 [0.33333091 0.66666585 0.33333125]
8127 [0.33333436 0.66666388 0.33333118]
8128 [0.33333397 0.66666751 0.33332945]
8129 [0.33332935 0.66666678 0.33333266]]
8130 fxs: [2.44578903e-12 2.64449602e-12 5.00397718e-12 1.08896517e-11
8131 1.34796685e-11 1.62096559e-11 1.63171911e-11]
8132 Centroid: [0.33333252 0.66666604 0.33333156]
8133 x_new: [[0.33333568 0.66666529 0.33333047]]
8134 fx_new [1.56268516e-11]
8135 Back to top
8136
8137 xs: [[0.3333326 0.66666725 0.33333208]
8138 [0.3333329 0.66666512 0.33333307]
8139 [0.33333354 0.66666588 0.33333125]
8140 [0.33333091 0.66666585 0.33333125]
8141 [0.33333436 0.66666388 0.33333118]
8142 [0.33333568 0.66666529 0.33333047]
8143 [0.33333397 0.66666751 0.33332945]]
8144 fxs: [2.44578903e-12 2.64449602e-12 5.00397718e-12 1.08896517e-11
8145 1.34796685e-11 1.56268516e-11 1.62096559e-11]
8146 Centroid: [0.33333342 0.66666583 0.33333125]
8147 x_new: [[0.33333287 0.66666414 0.33333305]]
8148 fx_new [6.68325749e-12]
8149 Back to top
8150
8151 xs: [[0.3333326 0.66666725 0.33333208]
8152 [0.3333329 0.66666512 0.33333307]
8153 [0.33333354 0.66666588 0.33333125]
8154 [0.33333287 0.66666414 0.33333305]
8155 [0.33333091 0.66666585 0.33333125]
8156 [0.33333436 0.66666388 0.33333118]
8157 [0.33333568 0.66666529 0.33333047]]
8158 fxs: [2.44578903e-12 2.64449602e-12 5.00397718e-12 6.68325749e-12
8159 1.08896517e-11 1.34796685e-11 1.56268516e-11]
8160 Centroid: [0.33333327 0.66666534 0.33333176]
8161 x_new: [[0.33333085 0.66666539 0.33333306]]
8162 fx_new [7.86923732e-12]
8163 Back to top
8164
8165 xs: [[0.3333326 0.66666725 0.33333208]
8166 [0.3333329 0.66666512 0.33333307]
8167 [0.33333354 0.66666588 0.33333125]
8168 [0.33333287 0.66666414 0.33333305]
8169 [0.33333085 0.66666539 0.33333306]
8170 [0.33333091 0.66666585 0.33333125]
8171 [0.33333436 0.66666388 0.33333118]]
8172 fxs: [2.44578903e-12 2.64449602e-12 5.00397718e-12 6.68325749e-12

```

```

8173 7.86923732e-12 1.08896517e-11 1.34796685e-11]
8174 Centroid: [0.33333257 0.66666536 0.33333213]
8175 x_new: [[0.33333079 0.66666684 0.33333309]]
8176 fx_new [6.55064281e-12]
8177 Back to top
8178
8179 xs: [[0.3333326 0.66666725 0.33333208]
8180 [0.3333329 0.66666512 0.33333307]
8181 [0.33333354 0.66666588 0.33333125]
8182 [0.33333079 0.66666684 0.33333309]
8183 [0.33333287 0.66666414 0.33333305]
8184 [0.33333085 0.66666539 0.33333306]
8185 [0.33333091 0.66666585 0.33333125]]
8186 fxs: [2.44578903e-12 2.64449602e-12 5.00397718e-12 6.55064281e-12
8187 6.68325749e-12 7.86923732e-12 1.08896517e-11]
8188 Centroid: [0.33333207 0.66666578 0.33333241]
8189 x_new: [[0.33333322 0.66666571 0.33333357]]
8190 fx_new [9.7377986e-13]
8191 Expanding
8192
8193 xs: [[0.33333322 0.66666571 0.33333357]
8194 [0.3333326 0.66666725 0.33333208]
8195 [0.3333329 0.66666512 0.33333307]
8196 [0.33333354 0.66666588 0.33333125]
8197 [0.33333079 0.66666684 0.33333309]
8198 [0.33333287 0.66666414 0.33333305]
8199 [0.33333085 0.66666539 0.33333306]]
8200 fxs: [9.73779860e-13 2.44578903e-12 2.64449602e-12 5.00397718e-12
8201 6.55064281e-12 6.68325749e-12 7.86923732e-12]
8202 Centroid: [0.33333239 0.66666576 0.33333274]
8203 x_new: [[0.33333394 0.66666613 0.33333241]]
8204 fx_new [1.50106213e-12]
8205 Back to top
8206
8207 xs: [[0.33333322 0.66666571 0.33333357]
8208 [0.33333394 0.66666613 0.33333241]
8209 [0.3333326 0.66666725 0.33333208]
8210 [0.3333329 0.66666512 0.33333307]
8211 [0.33333354 0.66666588 0.33333125]
8212 [0.33333079 0.66666684 0.33333309]
8213 [0.33333287 0.66666414 0.33333305]]
8214 fxs: [9.73779860e-13 1.50106213e-12 2.44578903e-12 2.64449602e-12
8215 5.00397718e-12 6.55064281e-12 6.68325749e-12]
8216 Centroid: [0.33333284 0.66666587 0.33333264]
8217 x_new: [[0.3333328 0.6666676 0.33333224]]
8218 fx_new [2.34306012e-12]
8219 Back to top
8220
8221 xs: [[0.33333322 0.66666571 0.33333357]
8222 [0.33333394 0.66666613 0.33333241]
8223 [0.3333328 0.6666676 0.33333224]
8224 [0.3333326 0.66666725 0.33333208]
8225 [0.3333329 0.66666512 0.33333307]
8226 [0.33333354 0.66666588 0.33333125]
8227 [0.33333079 0.66666684 0.33333309]]
8228 fxs: [9.73779860e-13 1.50106213e-12 2.34306012e-12 2.44578903e-12
8229 2.64449602e-12 5.00397718e-12 6.55064281e-12]
8230 Centroid: [0.33333283 0.66666636 0.33333253]
8231 x_new: [[0.33333486 0.66666588 0.33333197]]
8232 fx_new [4.79689033e-12]
8233 Back to top
8234
8235 xs: [[0.33333322 0.66666571 0.33333357]
8236 [0.33333394 0.66666613 0.33333241]
8237 [0.3333328 0.6666676 0.33333224]
8238 [0.3333326 0.66666725 0.33333208]
8239 [0.3333329 0.66666512 0.33333307]
8240 [0.33333486 0.66666588 0.33333197]
8241 [0.33333354 0.66666588 0.33333125]]
8242 fxs: [9.73779860e-13 1.50106213e-12 2.34306012e-12 2.44578903e-12

```

```

8243 2.64449602e-12 4.79689033e-12 5.00397718e-12]
8244 Centroid: [0.33333341 0.66666622 0.33333237]
8245 x_new: [[0.33333328 0.66666657 0.33333349]]
8246 fx_new [3.60984056e-14]
8247 Expanding
8248
8249 xs: [[0.33333328 0.66666657 0.33333349]
8250 [0.33333322 0.66666571 0.33333357]
8251 [0.33333394 0.66666613 0.33333241]
8252 [0.33333328 0.66666676 0.33333224]
8253 [0.33333326 0.66666725 0.33333208]
8254 [0.33333329 0.66666512 0.33333307]
8255 [0.33333486 0.66666588 0.33333197]]
8256 fxs: [3.60984056e-14 9.73779860e-13 1.50106213e-12 2.34306012e-12
8257 2.44578903e-12 2.64449602e-12 4.79689033e-12]
8258 Centroid: [0.33333337 0.66666632 0.33333269]
8259 x_new: [[0.33333188 0.66666677 0.33333341]]
8260 fx_new [2.12647142e-12]
8261 Back to top
8262
8263 xs: [[0.33333328 0.66666657 0.33333349]
8264 [0.33333322 0.66666571 0.33333357]
8265 [0.33333394 0.66666613 0.33333241]
8266 [0.33333188 0.66666677 0.33333341]
8267 [0.33333328 0.66666676 0.33333224]
8268 [0.33333326 0.66666725 0.33333208]
8269 [0.33333329 0.66666512 0.33333307]]
8270 fxs: [3.60984056e-14 9.73779860e-13 1.50106213e-12 2.12647142e-12
8271 2.34306012e-12 2.44578903e-12 2.64449602e-12]
8272 Centroid: [0.33333294 0.66666645 0.3333329 ]
8273 x_new: [[0.33333299 0.66666778 0.33333273]]
8274 fx_new [1.72297665e-12]
8275 Back to top
8276
8277 xs: [[0.33333328 0.66666657 0.33333349]
8278 [0.33333322 0.66666571 0.33333357]
8279 [0.33333394 0.66666613 0.33333241]
8280 [0.33333299 0.66666778 0.33333273]
8281 [0.33333188 0.66666677 0.33333341]
8282 [0.33333328 0.66666676 0.33333224]
8283 [0.33333326 0.66666725 0.33333208]]
8284 fxs: [3.60984056e-14 9.73779860e-13 1.50106213e-12 1.72297665e-12
8285 2.12647142e-12 2.34306012e-12 2.44578903e-12]
8286 Centroid: [0.33333296 0.66666683 0.33333285]
8287 x_new: [[0.33333332 0.66666641 0.33333361]]
8288 fx_new [1.43003488e-13]
8289 Back to top
8290
8291 xs: [[0.33333328 0.66666657 0.33333349]
8292 [0.33333332 0.66666641 0.33333361]
8293 [0.33333322 0.66666571 0.33333357]
8294 [0.33333394 0.66666613 0.33333241]
8295 [0.33333299 0.66666778 0.33333273]
8296 [0.33333188 0.66666677 0.33333341]
8297 [0.33333328 0.66666676 0.33333224]]
8298 fxs: [3.60984056e-14 1.43003488e-13 9.73779860e-13 1.50106213e-12
8299 1.72297665e-12 2.12647142e-12 2.34306012e-12]
8300 Centroid: [0.33333306 0.66666671 0.33333307]
8301 x_new: [[0.33333332 0.66666582 0.33333389]]
8302 fx_new [1.01889038e-12]
8303 Back to top
8304
8305 xs: [[0.33333328 0.66666657 0.33333349]
8306 [0.33333332 0.66666641 0.33333361]
8307 [0.33333322 0.66666571 0.33333357]
8308 [0.33333332 0.66666582 0.33333389]
8309 [0.33333394 0.66666613 0.33333241]
8310 [0.33333299 0.66666778 0.33333273]
8311 [0.33333188 0.66666677 0.33333341]]
8312 fxs: [3.60984056e-14 1.43003488e-13 9.73779860e-13 1.01889038e-12

```

```

8313 1.50106213e-12 1.72297665e-12 2.12647142e-12]
8314 Centroid: [0.33333314 0.66666646 0.3333333 ]
8315 x_new: [[0.33333439 0.66666615 0.33333319]]
8316 fx_new [1.4098983e-12]
8317 Back to top
8318
8319 xs: [[0.33333328 0.66666657 0.33333349]
8320 [0.33333332 0.66666641 0.33333361]
8321 [0.33333322 0.66666571 0.33333357]
8322 [0.33333332 0.66666582 0.33333389]
8323 [0.33333439 0.66666615 0.33333319]
8324 [0.33333394 0.66666613 0.33333241]
8325 [0.33333299 0.66666778 0.33333273]]
8326 fxs: [3.60984056e-14 1.43003488e-13 9.73779860e-13 1.01889038e-12
8327 1.40989830e-12 1.50106213e-12 1.72297665e-12]
8328 Centroid: [0.33333349 0.66666637 0.33333327]
8329 x_new: [[0.3333334 0.66666496 0.33333381]]
8330 fx_new [3.59092713e-12]
8331 Contracting
8332
8333 xs: [[0.33333328 0.66666657 0.33333349]
8334 [0.33333334 0.66666679 0.33333311]
8335 [0.33333332 0.66666641 0.33333361]
8336 [0.33333322 0.66666571 0.33333357]
8337 [0.33333332 0.66666582 0.33333389]
8338 [0.33333439 0.66666615 0.33333319]
8339 [0.33333394 0.66666613 0.33333241]]
8340 fxs: [3.60984056e-14 6.72361811e-14 1.43003488e-13 9.73779860e-13
8341 1.01889038e-12 1.40989830e-12 1.50106213e-12]
8342 Centroid: [0.33333355 0.66666623 0.33333332]
8343 x_new: [[0.33333315 0.66666632 0.33333423]]
8344 fx_new [9.61990012e-13]
8345 Back to top
8346
8347 xs: [[0.33333328 0.66666657 0.33333349]
8348 [0.33333334 0.66666679 0.33333311]
8349 [0.33333332 0.66666641 0.33333361]
8350 [0.33333315 0.66666632 0.33333423]
8351 [0.33333322 0.66666571 0.33333357]
8352 [0.33333332 0.66666582 0.33333389]
8353 [0.33333439 0.66666615 0.33333319]]
8354 fxs: [3.60984056e-14 6.72361811e-14 1.43003488e-13 9.61990012e-13
8355 9.73779860e-13 1.01889038e-12 1.40989830e-12]
8356 Centroid: [0.33333343 0.66666626 0.33333358]
8357 x_new: [[0.33333247 0.66666636 0.33333398]]
8358 fx_new [1.24583234e-12]
8359 Back to top
8360
8361 xs: [[0.33333328 0.66666657 0.33333349]
8362 [0.33333334 0.66666679 0.33333311]
8363 [0.33333332 0.66666641 0.33333361]
8364 [0.33333315 0.66666632 0.33333423]
8365 [0.33333322 0.66666571 0.33333357]
8366 [0.33333332 0.66666582 0.33333389]
8367 [0.33333247 0.66666636 0.33333398]]
8368 fxs: [3.60984056e-14 6.72361811e-14 1.43003488e-13 9.61990012e-13
8369 9.73779860e-13 1.01889038e-12 1.24583234e-12]
8370 Centroid: [0.33333316 0.66666629 0.33333337 ]
8371 x_new: [[0.33333384 0.66666621 0.33333342]]
8372 fx_new [4.76521789e-13]
8373 Back to top
8374
8375 xs: [[0.33333328 0.66666657 0.33333349]
8376 [0.33333334 0.66666679 0.33333311]
8377 [0.33333332 0.66666641 0.33333361]
8378 [0.33333384 0.66666621 0.33333342]
8379 [0.33333315 0.66666632 0.33333423]
8380 [0.33333322 0.66666571 0.33333357]
8381 [0.33333332 0.66666582 0.33333389]]
8382 fxs: [3.60984056e-14 6.72361811e-14 1.43003488e-13 4.76521789e-13

```



```

8383 9.61990012e-13 9.73779860e-13 1.01889038e-12]
8384 Centroid: [0.33333335 0.66666626 0.33333362]
8385 x_new: [[0.33333338 0.6666667 0.33333334]]
8386 fx_new [4.03975548e-15]
8387 Expanding
8388
8389 xs: [[0.33333338 0.6666667 0.33333334]
8390 [0.33333328 0.66666657 0.33333349]
8391 [0.33333334 0.66666679 0.33333311]
8392 [0.33333332 0.66666641 0.33333361]
8393 [0.33333384 0.66666621 0.33333342]
8394 [0.33333315 0.66666632 0.33333423]
8395 [0.33333322 0.66666571 0.33333357]]
8396 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.43003488e-13
8397 4.76521789e-13 9.61990012e-13 9.73779860e-13]
8398 Centroid: [0.33333336 0.66666639 0.33333354]
8399 x_new: [[0.33333351 0.66666706 0.33333351]]
8400 fx_new [2.19806647e-13]
8401 Back to top
8402
8403 xs: [[0.33333338 0.6666667 0.33333334]
8404 [0.33333328 0.66666657 0.33333349]
8405 [0.33333334 0.66666679 0.33333311]
8406 [0.33333332 0.66666641 0.33333361]
8407 [0.33333351 0.66666706 0.33333351]
8408 [0.33333384 0.66666621 0.33333342]
8409 [0.33333315 0.66666632 0.33333423]]
8410 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.43003488e-13
8411 2.19806647e-13 4.76521789e-13 9.61990012e-13]
8412 Centroid: [0.33333334 0.66666658 0.33333353]
8413 x_new: [[0.33333366 0.66666684 0.33333283]]
8414 fx_new [3.92359832e-13]
8415 Back to top
8416
8417 xs: [[0.33333338 0.6666667 0.33333334]
8418 [0.33333328 0.66666657 0.33333349]
8419 [0.33333334 0.66666679 0.33333311]
8420 [0.33333332 0.66666641 0.33333361]
8421 [0.33333351 0.66666706 0.33333351]
8422 [0.33333366 0.66666684 0.33333283]
8423 [0.33333384 0.66666621 0.33333342]]
8424 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.43003488e-13
8425 2.19806647e-13 3.92359832e-13 4.76521789e-13]
8426 Centroid: [0.33333348 0.66666666 0.33333333]
8427 x_new: [[0.33333311 0.66666671 0.33333324]]
8428 fx_new [2.5022234e-13]
8429 Back to top
8430
8431 xs: [[0.33333338 0.6666667 0.33333334]
8432 [0.33333328 0.66666657 0.33333349]
8433 [0.33333334 0.66666679 0.33333311]
8434 [0.33333332 0.66666641 0.33333361]
8435 [0.33333351 0.66666706 0.33333351]
8436 [0.33333311 0.66666671 0.33333324]
8437 [0.33333366 0.66666684 0.33333283]]
8438 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.43003488e-13
8439 2.19806647e-13 2.50222340e-13 3.92359832e-13]
8440 Centroid: [0.33333337 0.66666678 0.33333333 ]
8441 x_new: [[0.33333308 0.66666673 0.33333378]]
8442 fx_new [2.66869825e-13]
8443 Back to top
8444
8445 xs: [[0.33333338 0.6666667 0.33333334]
8446 [0.33333328 0.66666657 0.33333349]
8447 [0.33333334 0.66666679 0.33333311]
8448 [0.33333332 0.66666641 0.33333361]
8449 [0.33333351 0.66666706 0.33333351]
8450 [0.33333311 0.66666671 0.33333324]
8451 [0.33333308 0.66666673 0.33333378]]
8452 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.43003488e-13

```

```

8453 2.19806647e-13 2.50222340e-13 2.66869825e-13]
8454 Centroid: [0.33333329 0.66666677 0.33333344]
8455 x_new: [[0.33333349 0.66666681 0.33333331 ]]
8456 fx_new [1.00587117e-13]
8457 Back to top
8458
8459 xs: [[0.33333338 0.66666667 0.33333334]
8460 [0.33333328 0.66666657 0.33333349]
8461 [0.33333334 0.66666679 0.33333311]
8462 [0.33333349 0.66666681 0.33333331 ]
8463 [0.33333332 0.66666641 0.33333361]
8464 [0.33333351 0.66666706 0.33333351]
8465 [0.33333311 0.6666671 0.33333324]]
8466 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.00587117e-13
8467 1.43003488e-13 2.19806647e-13 2.50222340e-13]
8468 Centroid: [0.33333335 0.66666678 0.33333334]
8469 x_new: [[0.33333359 0.66666646 0.33333344]]
8470 fx_new [1.21120076e-13]
8471 Back to top
8472
8473 xs: [[0.33333338 0.66666667 0.33333334]
8474 [0.33333328 0.66666657 0.33333349]
8475 [0.33333334 0.66666679 0.33333311]
8476 [0.33333349 0.66666681 0.33333331 ]
8477 [0.33333359 0.66666646 0.33333344]
8478 [0.33333332 0.66666641 0.33333361]
8479 [0.33333351 0.66666706 0.33333351]]
8480 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.00587117e-13
8481 1.21120076e-13 1.43003488e-13 2.19806647e-13]
8482 Centroid: [0.33333342 0.66666669 0.33333337]
8483 x_new: [[0.33333333 0.66666631 0.33333323]]
8484 fx_new [1.37791482e-13]
8485 Back to top
8486
8487 xs: [[0.33333338 0.66666667 0.33333334]
8488 [0.33333328 0.66666657 0.33333349]
8489 [0.33333334 0.66666679 0.33333311]
8490 [0.33333349 0.66666681 0.33333331 ]
8491 [0.33333359 0.66666646 0.33333344]
8492 [0.33333333 0.66666631 0.33333323]
8493 [0.33333332 0.66666641 0.33333361]]
8494 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.00587117e-13
8495 1.21120076e-13 1.37791482e-13 1.43003488e-13]
8496 Centroid: [0.33333339 0.66666658 0.33333333]
8497 x_new: [[0.33333346 0.66666675 0.33333305]]
8498 fx_new [1.0088249e-13]
8499 Back to top
8500
8501 xs: [[0.33333338 0.66666667 0.33333334]
8502 [0.33333328 0.66666657 0.33333349]
8503 [0.33333334 0.66666679 0.33333311]
8504 [0.33333349 0.66666681 0.33333331 ]
8505 [0.33333346 0.66666675 0.33333305]
8506 [0.33333359 0.66666646 0.33333344]
8507 [0.33333333 0.66666631 0.33333323]]
8508 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.00587117e-13
8509 1.00882490e-13 1.21120076e-13 1.37791482e-13]
8510 Centroid: [0.33333341 0.66666663 0.33333325]
8511 x_new: [[0.33333335 0.66666695 0.33333327]]
8512 fx_new [1.07720424e-13]
8513 Back to top
8514
8515 xs: [[0.33333338 0.66666667 0.33333334]
8516 [0.33333328 0.66666657 0.33333349]
8517 [0.33333334 0.66666679 0.33333311]
8518 [0.33333349 0.66666681 0.33333331 ]
8519 [0.33333346 0.66666675 0.33333305]
8520 [0.33333335 0.66666695 0.33333327]
8521 [0.33333359 0.66666646 0.33333344]]
8522 fxs: [4.03975548e-15 3.60984056e-14 6.72361811e-14 1.00587117e-13

```

```

8523 1.00882490e-13 1.07720424e-13 1.21120076e-13]
8524 Centroid: [0.33333343 0.66666672 0.33333326]
8525 x_new: [[0.33333328 0.66666698 0.33333307]]
8526 fx_new [1.69335975e-13]
8527 Contracting
8528
8529 xs: [[0.33333338 0.66666667 0.33333334]
8530 [0.33333348 0.66666664 0.33333331]
8531 [0.33333328 0.66666657 0.33333349]
8532 [0.33333334 0.66666679 0.33333311]
8533 [0.33333349 0.66666681 0.3333331 ]
8534 [0.33333346 0.66666675 0.33333305]
8535 [0.33333335 0.66666695 0.33333327]]
8536 fxs: [4.03975548e-15 2.26997929e-14 3.60984056e-14 6.72361811e-14
8537 1.00587117e-13 1.00882490e-13 1.07720424e-13]
8538 Centroid: [0.33333342 0.66666674 0.33333324]
8539 x_new: [[0.33333334 0.66666654 0.33333321]]
8540 fx_new [3.10649733e-14]
8541 Back to top
8542
8543 xs: [[0.33333338 0.66666667 0.33333334]
8544 [0.33333348 0.66666664 0.33333331]
8545 [0.33333334 0.66666654 0.33333321]
8546 [0.33333328 0.66666657 0.33333349]
8547 [0.33333334 0.66666679 0.33333311]
8548 [0.33333349 0.66666681 0.3333331 ]
8549 [0.33333346 0.66666675 0.33333305]]
8550 fxs: [4.03975548e-15 2.26997929e-14 3.10649733e-14 3.60984056e-14
8551 6.72361811e-14 1.00587117e-13 1.00882490e-13]
8552 Centroid: [0.33333334 0.66666669 0.33333323]
8553 x_new: [[0.33333333 0.66666663 0.33333341]]
8554 fx_new [7.08954618e-15]
8555 Back to top
8556
8557 xs: [[0.33333338 0.66666667 0.33333334]
8558 [0.33333333 0.66666663 0.33333341]
8559 [0.33333348 0.66666664 0.33333331]
8560 [0.33333334 0.66666654 0.33333321]
8561 [0.33333328 0.66666657 0.33333349]
8562 [0.33333334 0.66666679 0.33333311]
8563 [0.33333349 0.66666681 0.3333331 ]]
8564 fxs: [4.03975548e-15 7.08954618e-15 2.26997929e-14 3.10649733e-14
8565 3.60984056e-14 6.72361811e-14 1.00587117e-13]
8566 Centroid: [0.33333338 0.66666667 0.33333328]
8567 x_new: [[0.33333327 0.66666653 0.33333346]]
8568 fx_new [3.98116969e-14]
8569 Back to top
8570
8571 xs: [[0.33333338 0.66666667 0.33333334]
8572 [0.33333333 0.66666663 0.33333341]
8573 [0.33333348 0.66666664 0.33333331]
8574 [0.33333334 0.66666654 0.33333321]
8575 [0.33333328 0.66666657 0.33333349]
8576 [0.33333327 0.66666653 0.33333346]
8577 [0.33333334 0.66666679 0.33333311]]
8578 fxs: [4.03975548e-15 7.08954618e-15 2.26997929e-14 3.10649733e-14
8579 3.60984056e-14 3.98116969e-14 6.72361811e-14]
8580 Centroid: [0.33333335 0.66666663 0.33333333]
8581 x_new: [[0.33333335 0.66666647 0.33333356]]
8582 fx_new [9.08736176e-14]
8583 Contracting
8584
8585 xs: [[0.33333338 0.66666667 0.33333334]
8586 [0.33333335 0.66666668 0.33333327]
8587 [0.33333333 0.66666663 0.33333341]
8588 [0.33333348 0.66666664 0.33333331]
8589 [0.33333334 0.66666654 0.33333321]
8590 [0.33333328 0.66666657 0.33333349]
8591 [0.33333327 0.66666653 0.33333346]]
8592 fxs: [4.03975548e-15 4.96403640e-15 7.08954618e-15 2.26997929e-14

```

```
8593 3.10649733e-14 3.60984056e-14 3.98116969e-14]
8594 Centroid: [0.33333335 0.66666661 0.33333336]
8595 x_new: [[0.33333343 0.66666667 0.33333325]]
8596 fx_new [1.72819609e-14]
8597 Back to top
8598 Found minimum after 614 iterations
```

NR_a1_3_main.txt