In [1]:

```
import numpy as np
from scipy.integrate import odeint
%matplotlib inline
import matplotlib.pyplot as plt
from matplotlib.backends.backend_pdf import PdfPages
import sys
```

In [2]:

```
t = np.linspace(0,50395, num=10080)
lightdata = np.transpose(np.delete(np.genfromtxt('AllLightnosmooth.csv', delimiter=',')


def func(t):
    z0 = [1,0,0,0,0,0]
    #mCherry2 = np.empty((len(lightdata[:,0]), len(t)))
    out =  np.empty((len(lightdata[:,0]),len(t),6))
    arrayvalues = np.asarray([])
    #for i in range(42):
    for i in range(len(lightdata[:,0])):
        def I(t):
            tindex = t/5
            if tindex > 10079:
                tindex = 10079
            return lightdata[i][int(tindex)]

        def model(z,t):
            d1 = 0.017981
            k1 = 0.118682
            d2 = 2.296629
            k2 = 0.026267
            Kd = 72.69424
            n = 1.289105
            k3 = 0.000279
            d3 = 0.000544
            k4 = 1.25
            d4 = 0.0000924
            k5 = 0.00144



            Pu = z[0]
            Pb = z[1]
            Pa = z[2]
            mRNA = z[3]
            mCherry1 = z[4]
            mCherry2 = z[5]

            dPudt = d1*Pb - k1*I(t)**n/(Kd**n+I(t)**n)*Pu
            dPbdt = k1*I(t)**n/(Kd**n+I(t)**n)*Pu + d2*Pa - d1*Pb - k2*Pb
            dPadt = k2*Pb - d2*Pa
            dmRNAdt = k3*Pa - d3*mRNA
            dmCherry1dt = k4*mRNA-(d4 + k5)*mCherry1
            dmCherry2dt = k5*mCherry1-d4*mCherry2
            return [dPudt,dPbdt,dPadt,dmRNAdt,dmCherry1dt,dmCherry2dt]

        z = odeint(model,z0,t)
        #mCherry2[i] = z[:,5]
        out[i] = z
    return out
```

In [3]:

```
model1 = np.asarray(func(t))
mCherry2 = model1[:,:,5]
Pu = model1[:,:,0]
Pb = model1[:,:,1]
Pa = model1[:,:,2]
mRNA = model1[:,:,3]

#total = Pu+Pb+Pa+Pi
#print(total)

#for i in range(42):
for i in range(len(lightdata[:,0])):
    last = mCherry2[i]
    ##total = Pi[i]+Pu[i]+Pb[i]+Pa[i]
    print(last[-1])
```

```
43.22293141410458
23.689923981188144
14.014047363170572
0.0032994740366985693
0.0010789760956070261
49.925948885080345
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0.05657083253912293
0.001956649374544469
0.0019566168499721534
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2.437745887877762
0.012077858970030414
0.012077858970030414
42.59176793342165
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4.371288695149969
1.146992207779832
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```

```
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```
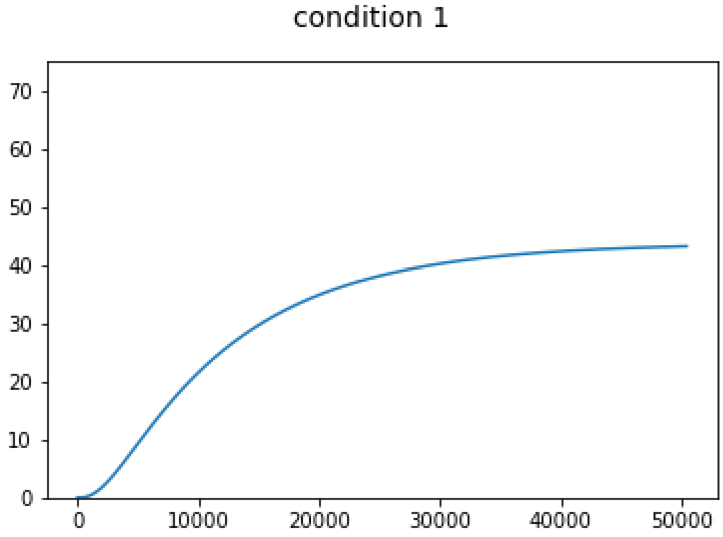
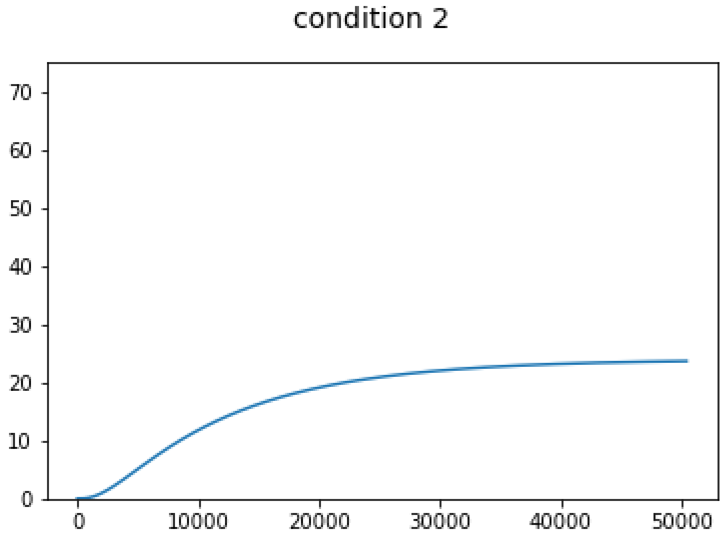

```
0.31063192624347646
54.28163540753594
59.29057203318615
62.43585346909243
62.80030004132466
```

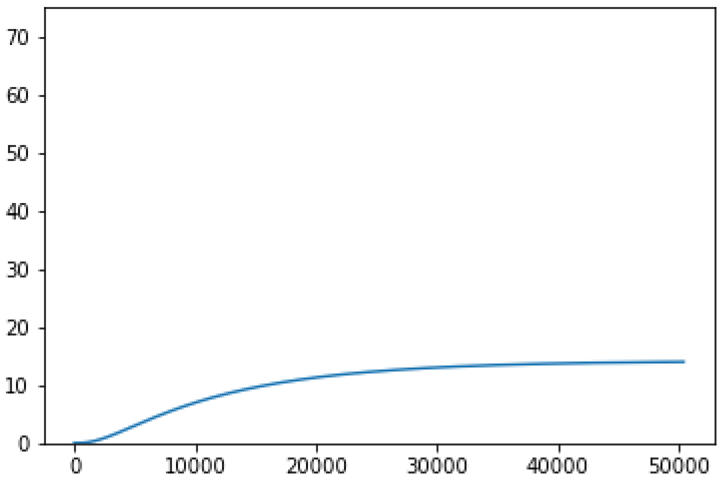
In [4]:

```
import csv
pp = PdfPages('multipage.pdf')

#for i in range(42):
for i in range(len(lightdata[:,0])):
#    mCherry2 = model1[:,:,6]
#    with open('dataout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in mCherry2:
#            csvwriter.writerow(row)
#    Pu = model1[:,:,0]
#    with open('Puout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in Pu:
#            csvwriter.writerow(row)
#    Pb = model1[:,:,1]
#    with open('Pbout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in Pb:
#            csvwriter.writerow(row)
#    Pi = model1[:,:,2]
#    with open('Piout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in Pi:
#            csvwriter.writerow(row)
#    Pa = model1[:,:,3]
#    with open('Paout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in Pa:
#            csvwriter.writerow(row)
#    mRNA = model1[:,:,4]
#    with open('mRNAout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in mRNA:
#            csvwriter.writerow(row)
    #U=U*100;
    #Pu=Pu*100;
    #Pb=Pb*100;
    #Pa=Pa*100;
    #t = np.linspace(0,50395, num=10080)
    #plt.plot(t,U[i])
    #plt.plot(t,Pu[i])
    #plt.plot(t,Pb[i])
    #plt.plot(t,Pa[i])
    #plt.legend(['U','Pu','Pb','Pa'])
    #plt.plot(t,lightdata[i])
    plt.plot(t,mCherry2[i])
    #plt.xlabel('Time [s]')
    #plt.ylabel('Fluoresence [a.u.]')
    plt. suptitle('condition '+str(i+1),fontsize = 14)
    plt.ylim((0,75))


    #def annot_max (t, mCherry2, ax=None):
    #    tmax = t[np.argmax(mCherry2[i])]
    #    ymax = mCherry2[i].max()
    #    text = "t={:.3f}, y={:.3f}".format(tmax,ymax)
    #    print(i+1, ymax)
    #    if not ax:
    #        ax=plt.gca()
    #    bbox_props = dict(boxstyle = "square,pad=0.3", fc="w", ec="k",lw=0.72)
    #    arrowprops = dict(arrowstyle="->", connectionstyle = "angle,angleA=0,angleB=60
    #    kw = dict(xycoords='data', textcoords="axes fraction", arrowprops=arrowprops,
    #    ax.annotate(text,xy=(tmax,ymax), xytext=(0.94,0.7), **kw)
    #annot_max(t,mCherry2)
    pp.savefig()
    plt.show()

pp.close()
```

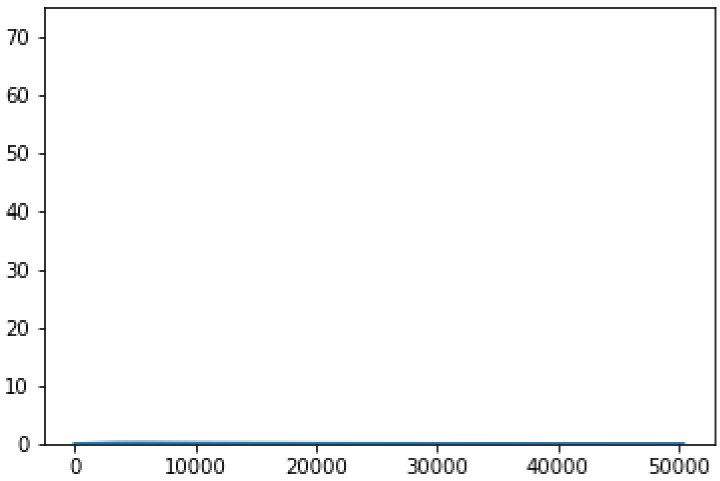




condition 3



condition 4



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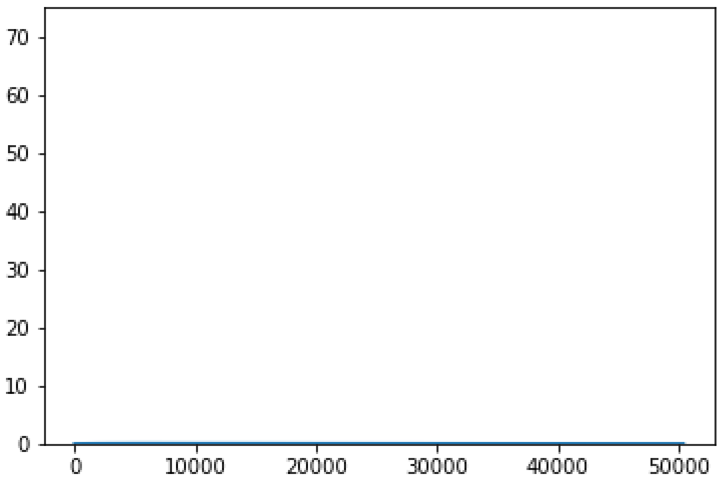

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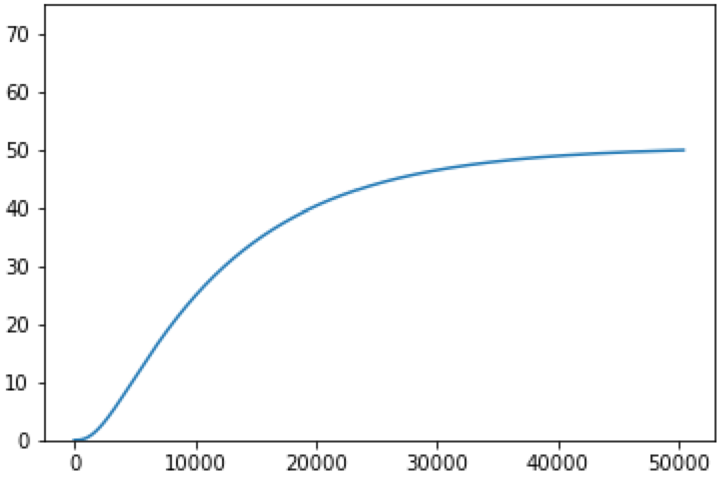

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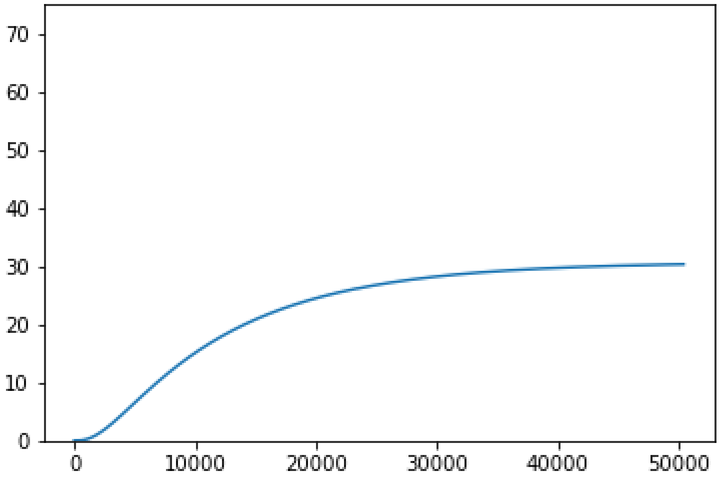

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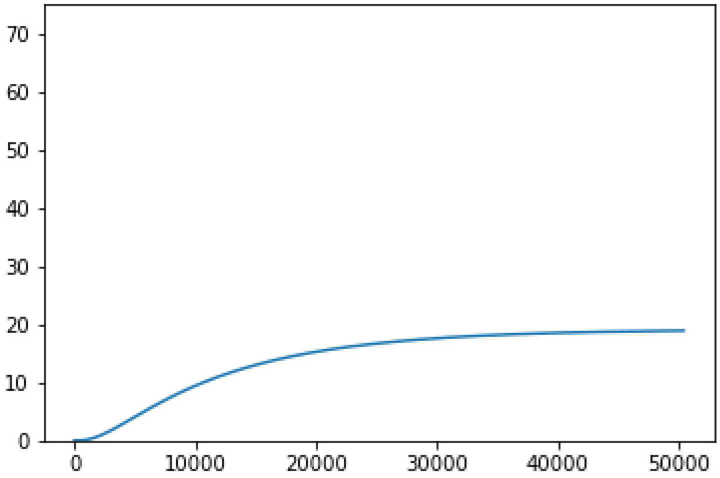

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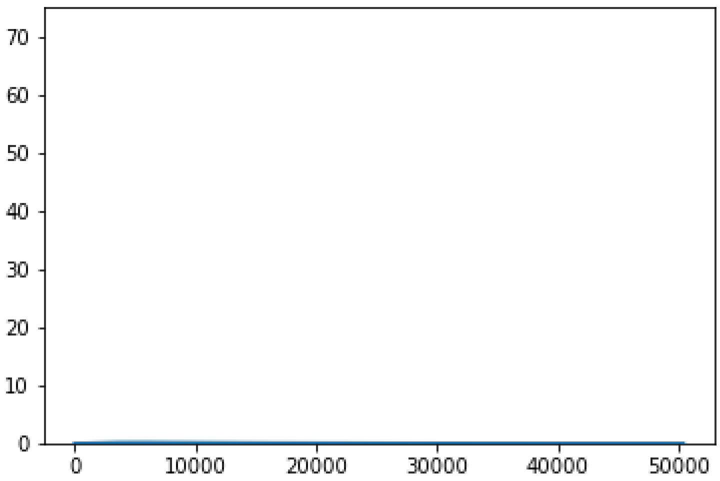

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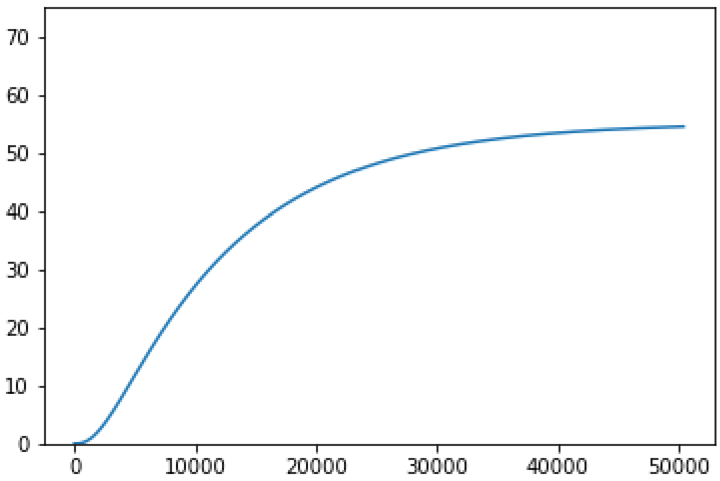

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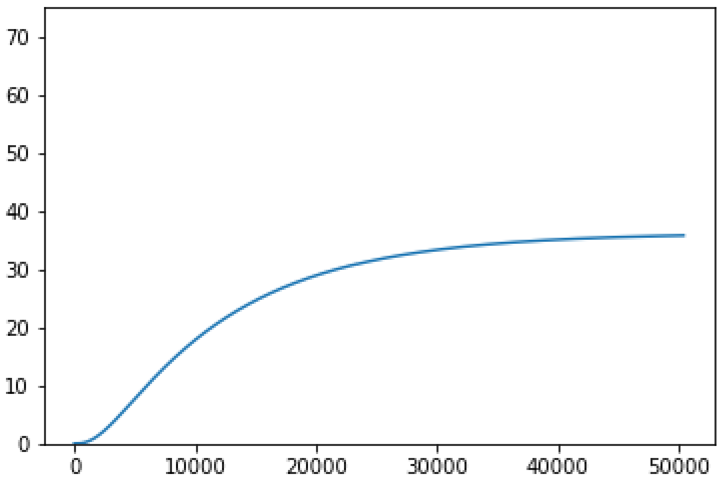

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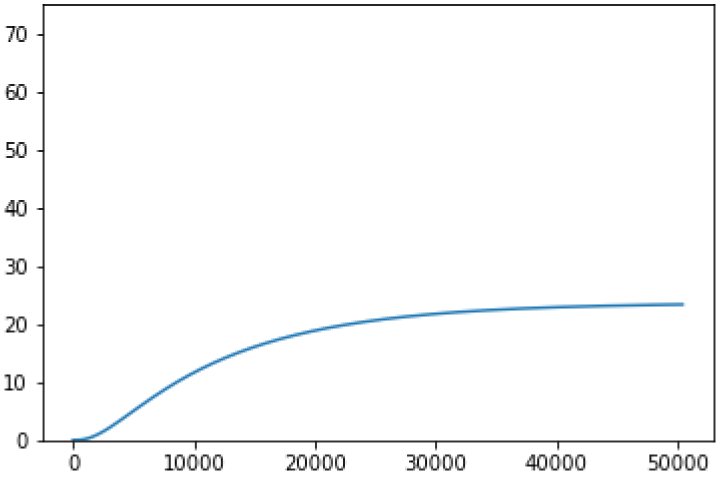

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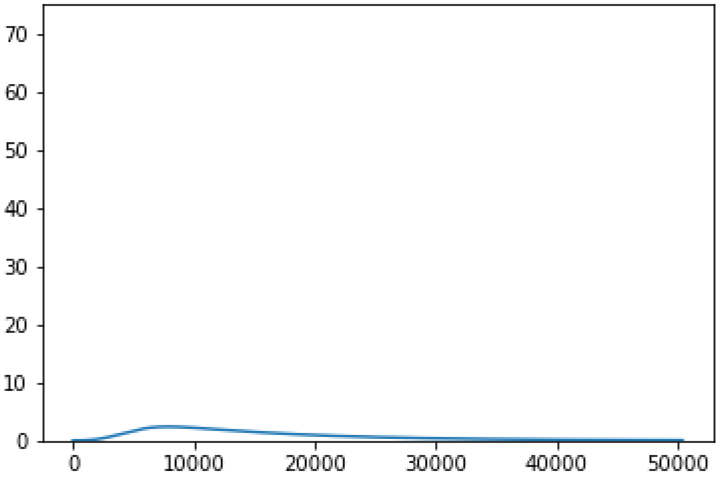

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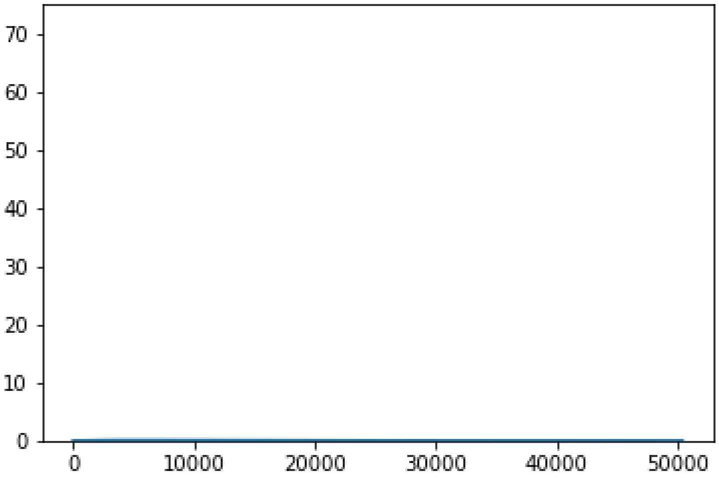

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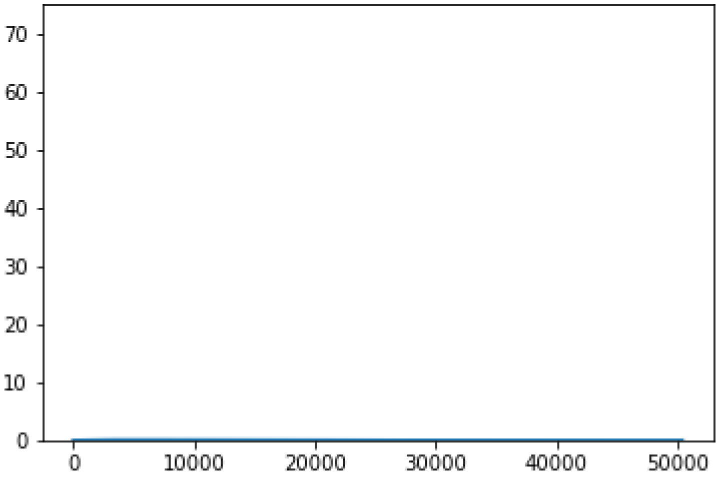
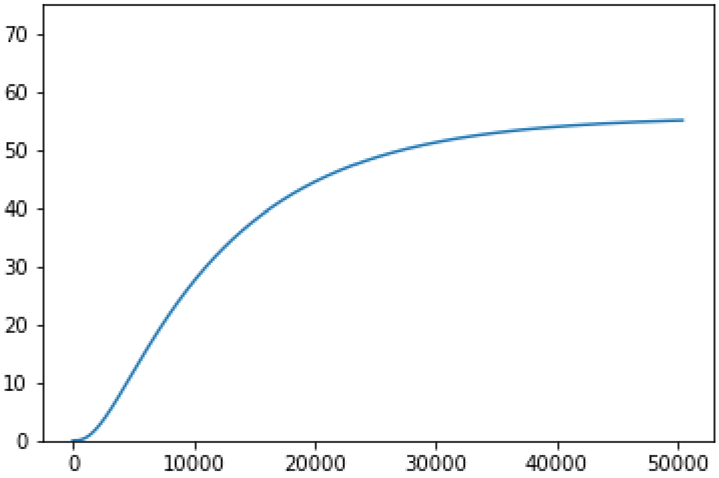


condition 16



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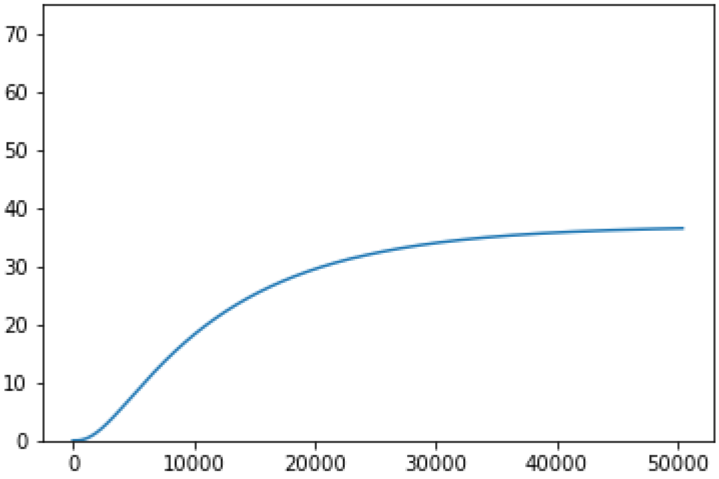
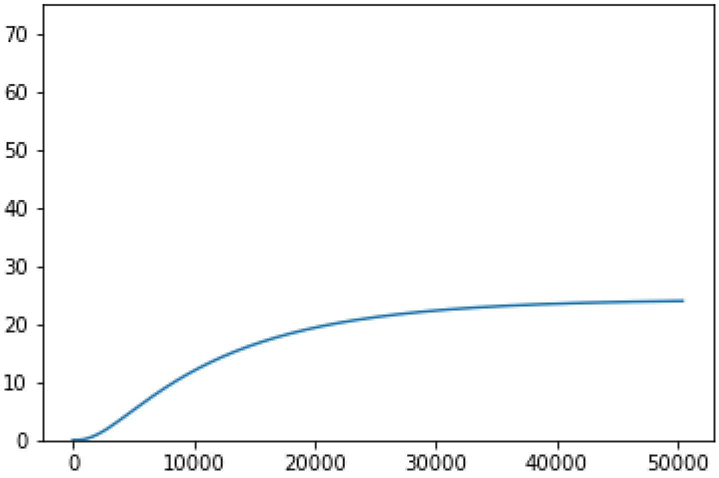
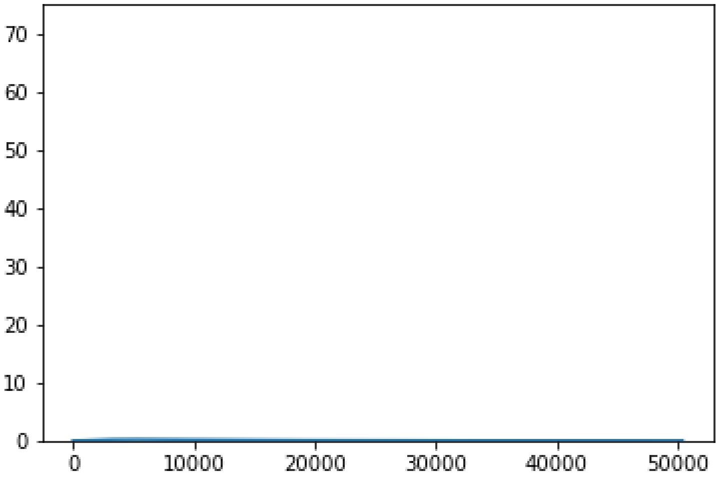


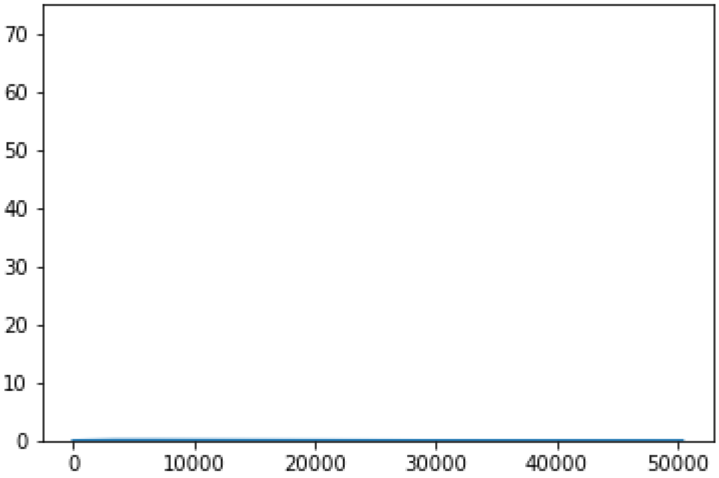
condition 18



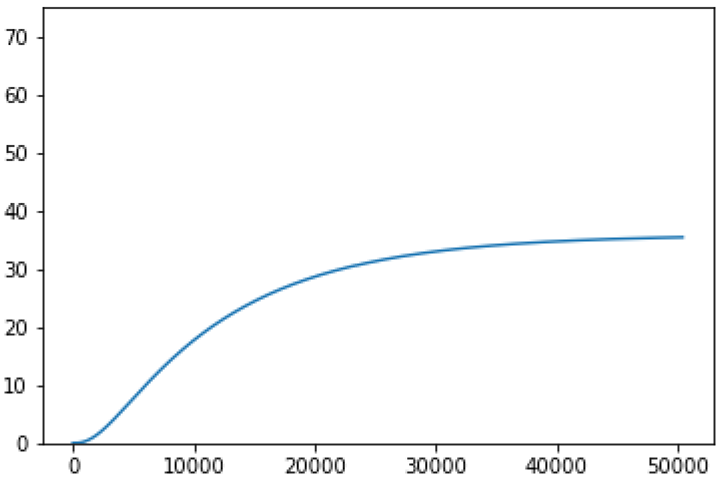
condition 19



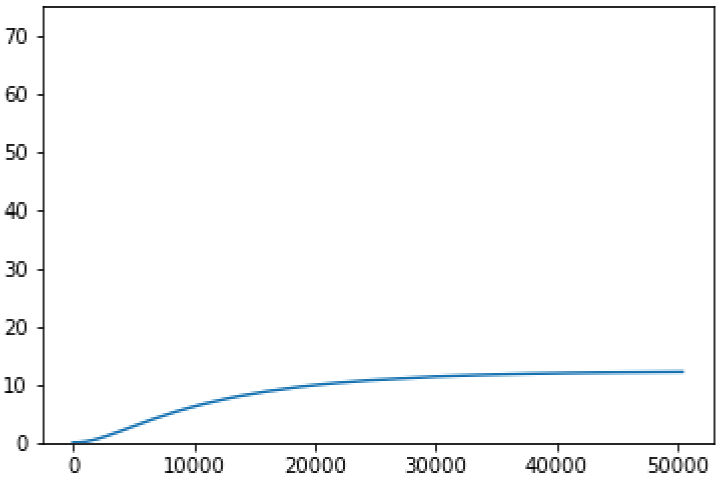
condition 20



condition 21



condition 22



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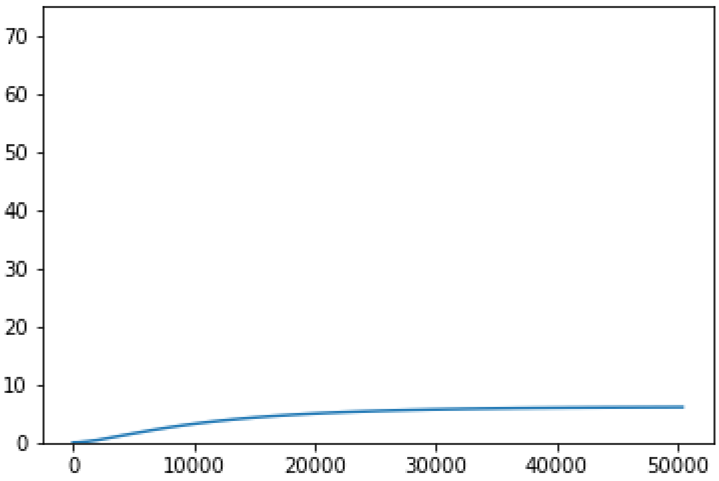

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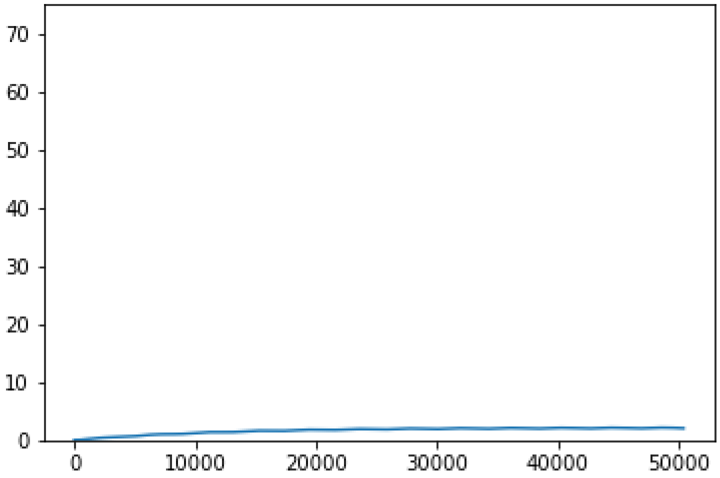

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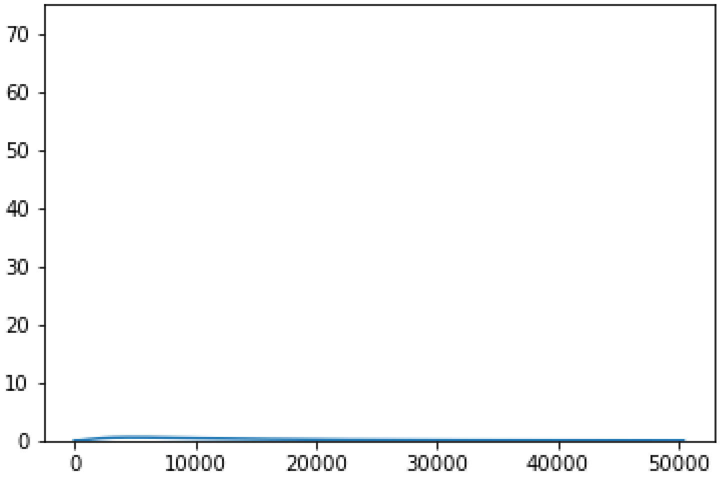
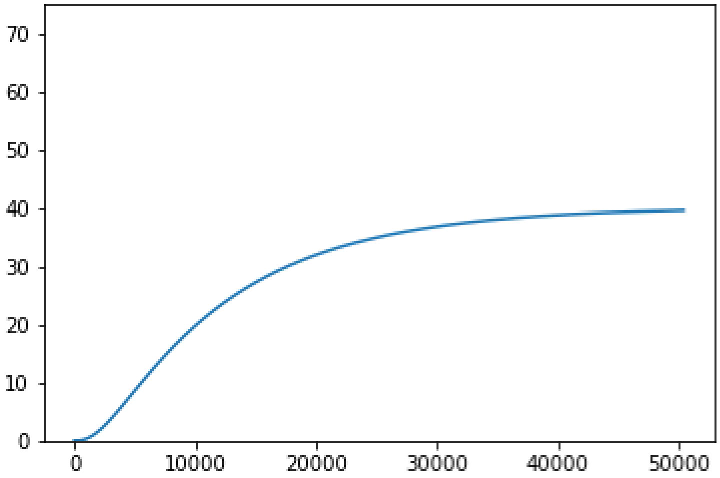


condition 26



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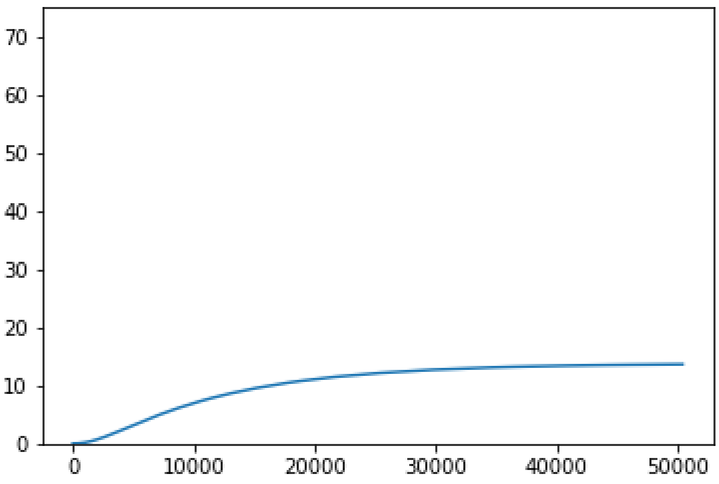

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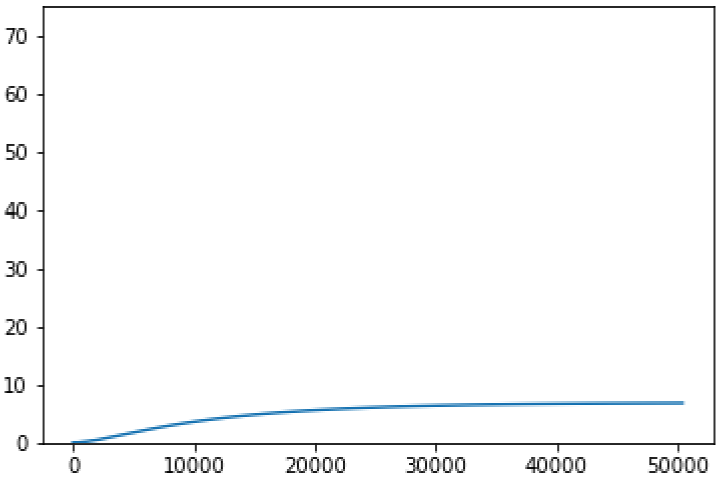

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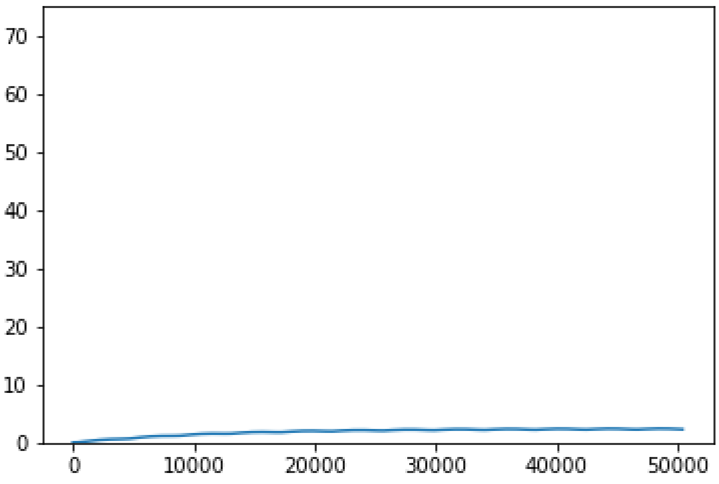

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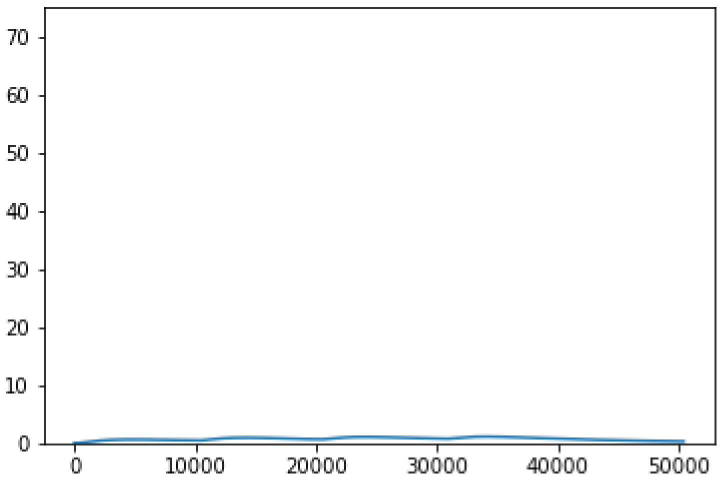

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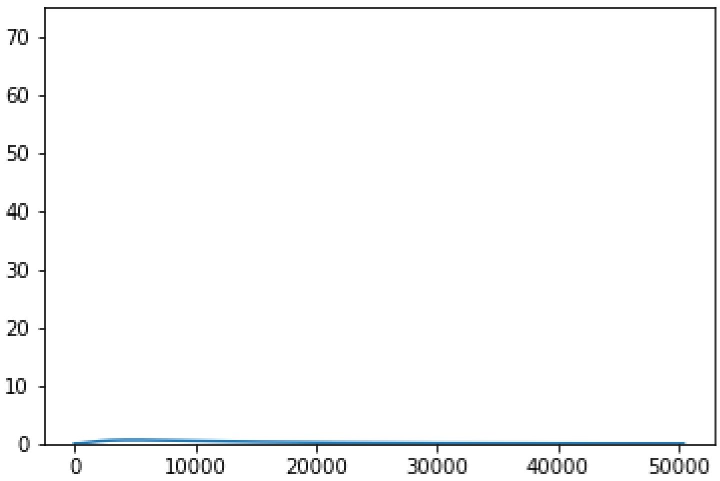
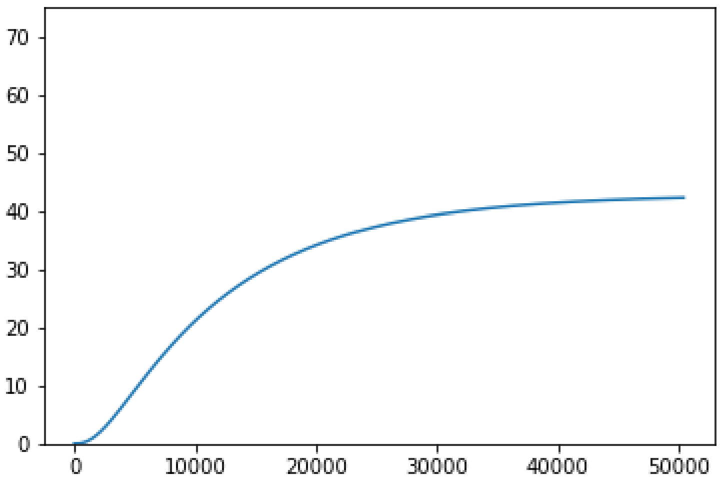
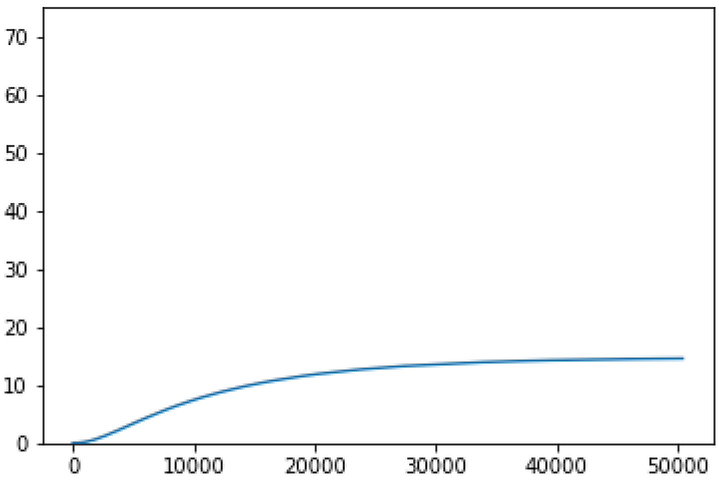


condition 32

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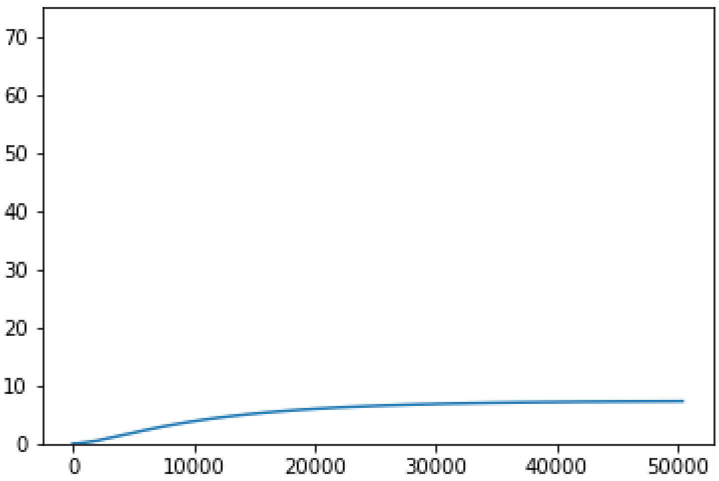
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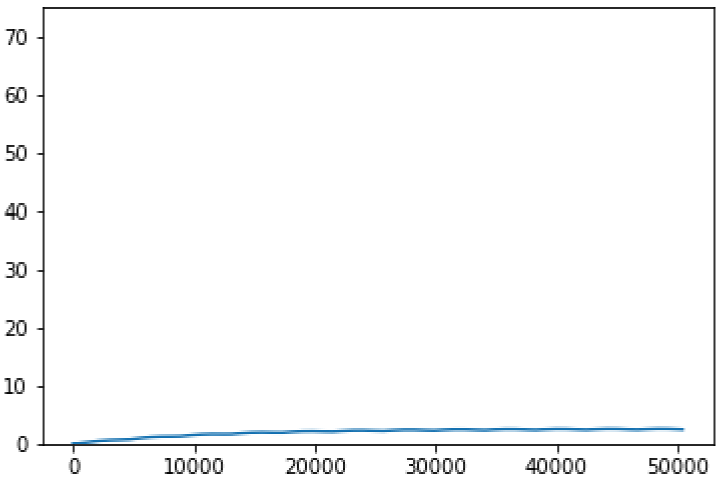
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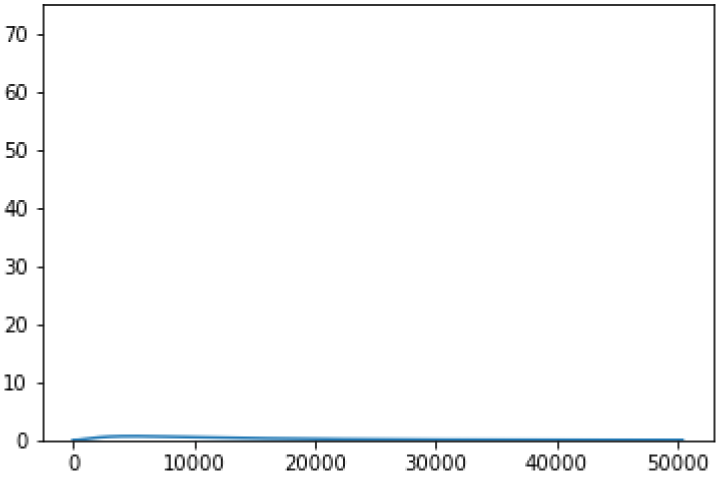

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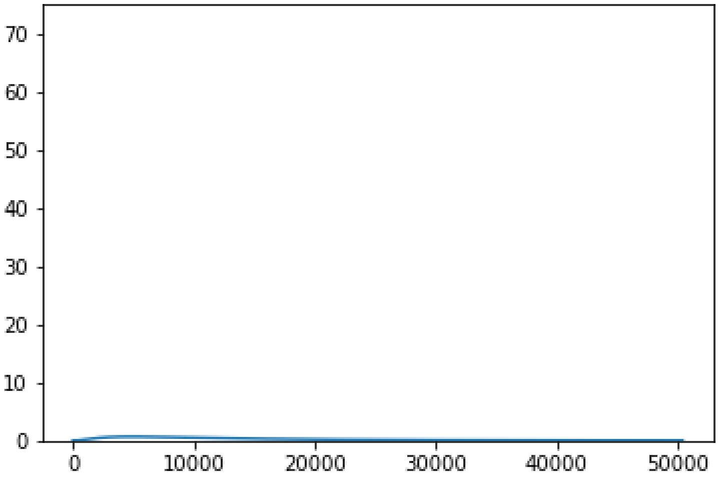

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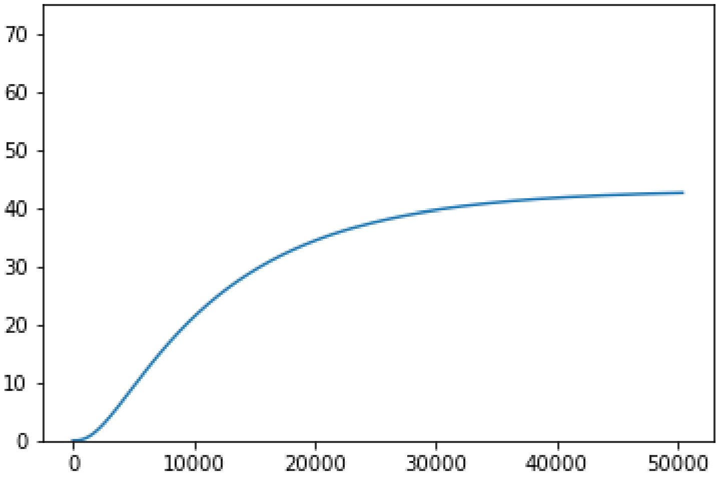
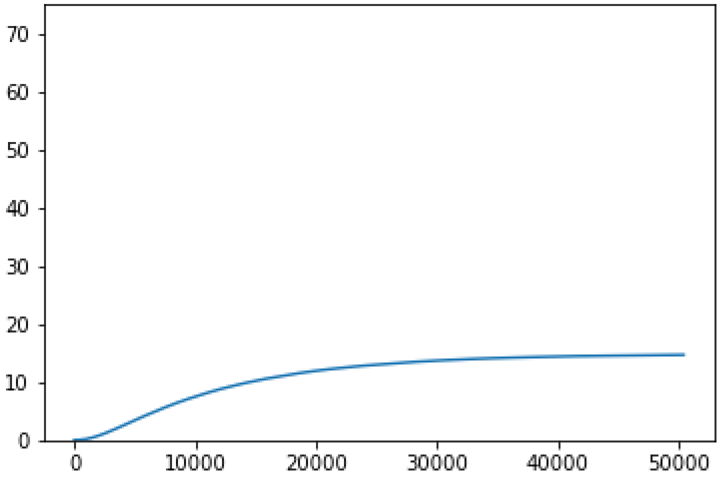
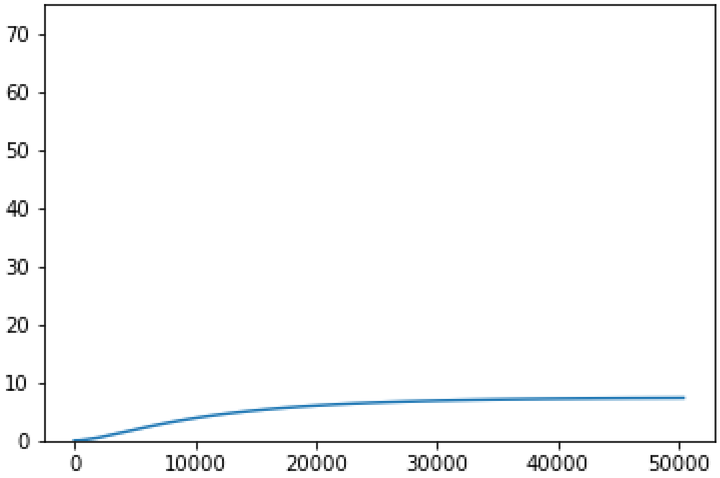


condition 38

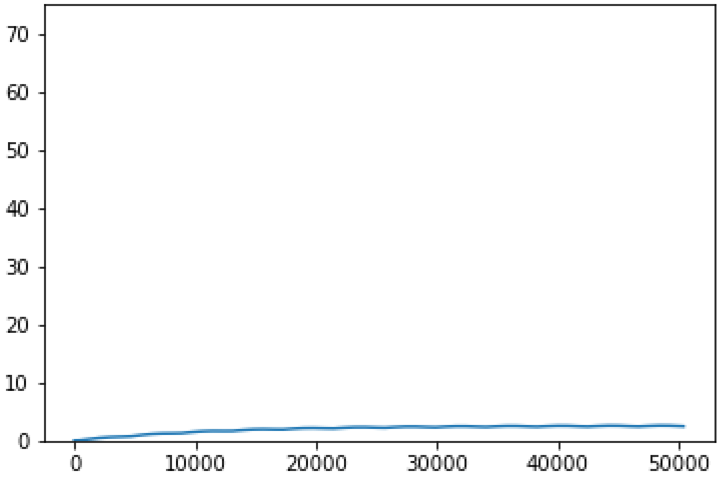
condition 39

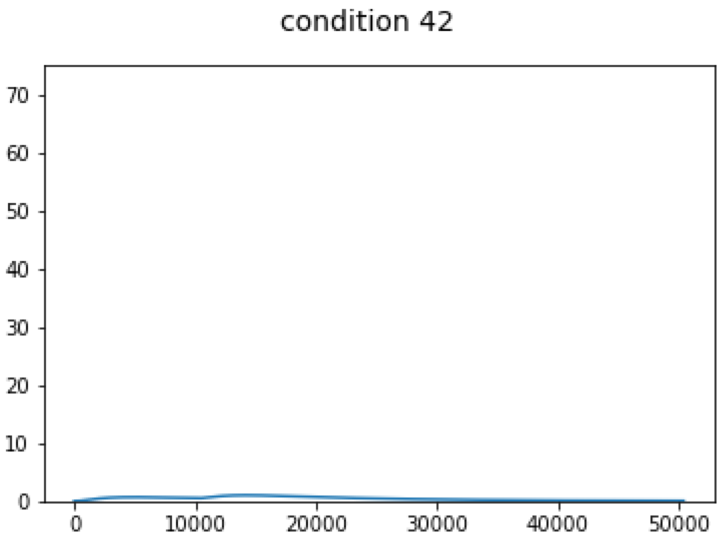


condition 40



condition 41




condition 42
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40
30
20
10
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0
10000
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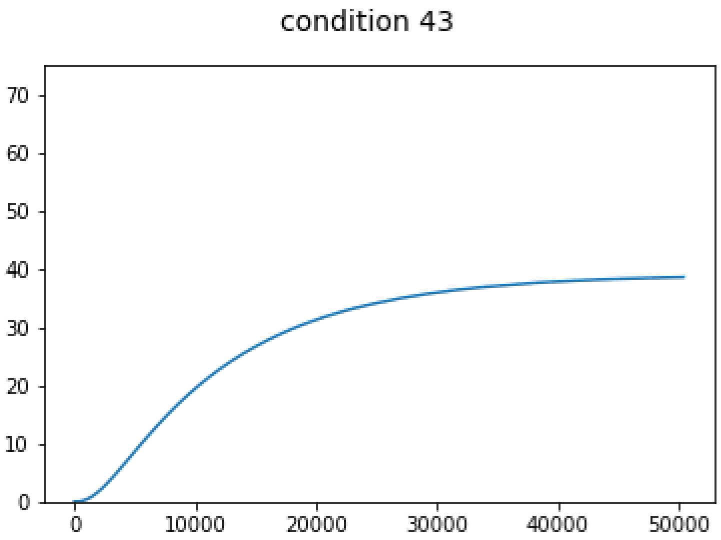
30000
40000
50000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30
20
10
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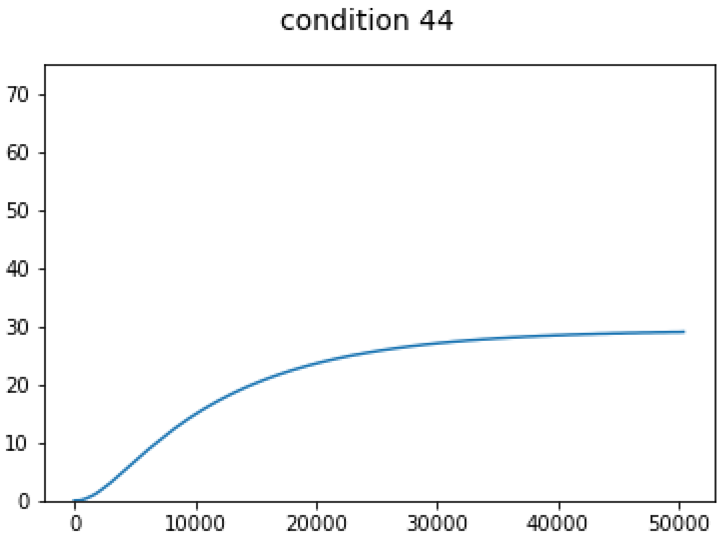
0
10000
20000
30000
40000
50000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30
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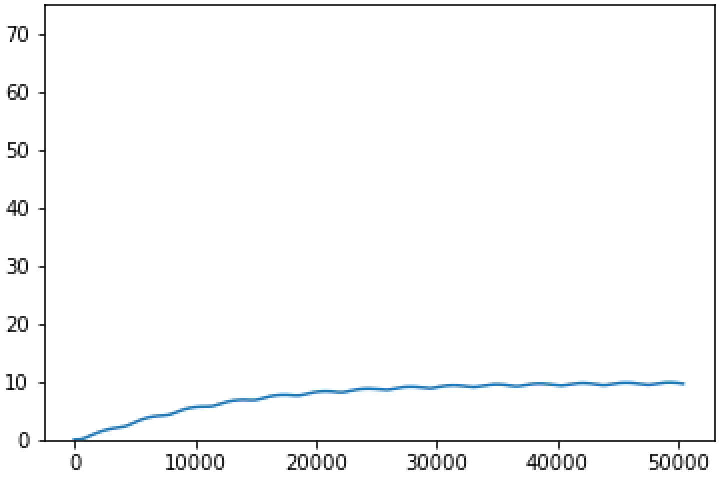
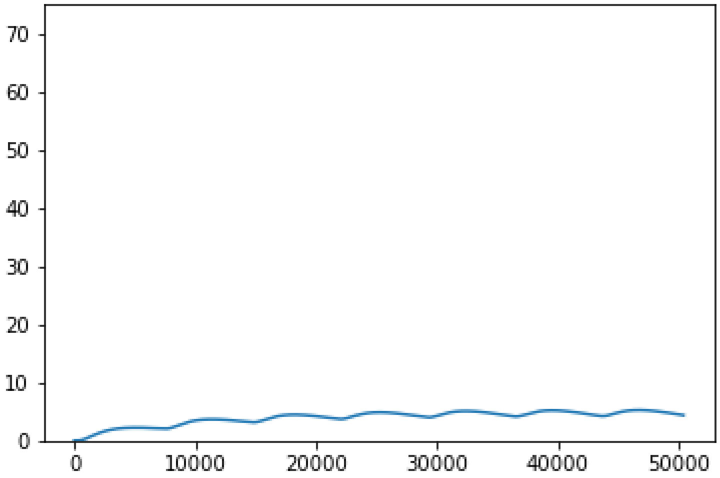
10
0
0
10000
20000
30000
40000
50000

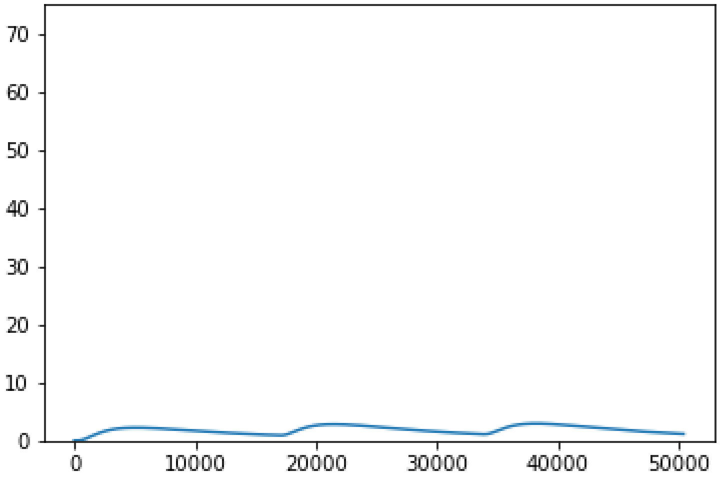
condition 45



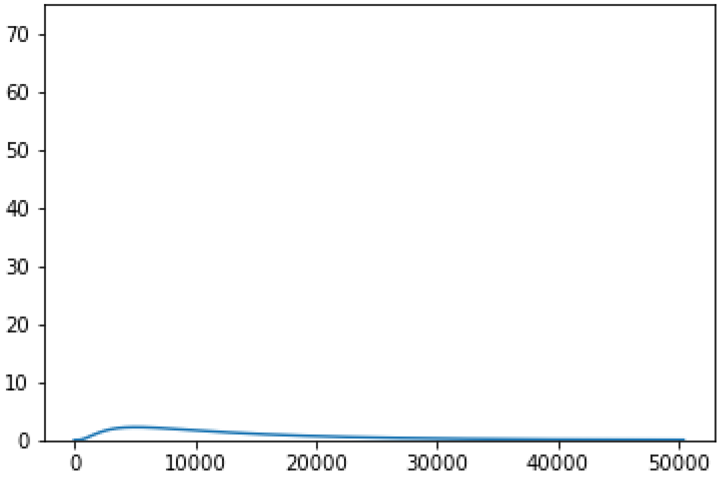
condition 46



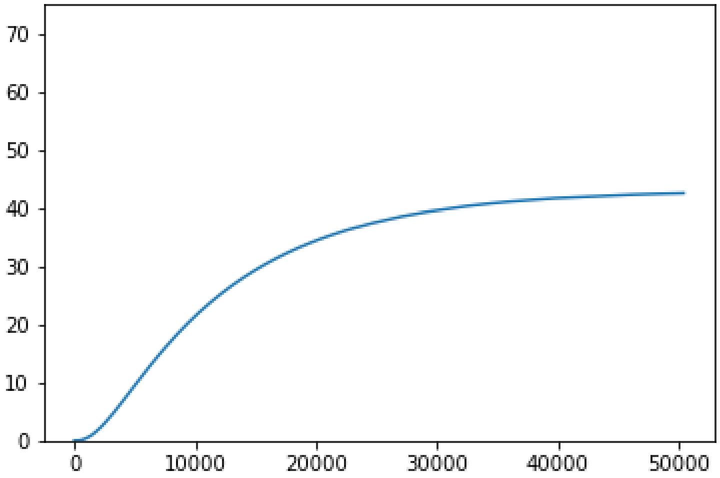
condition 47



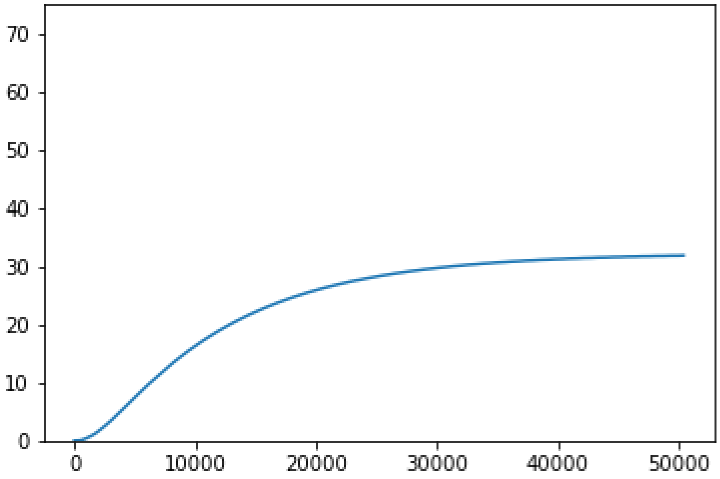
condition 48



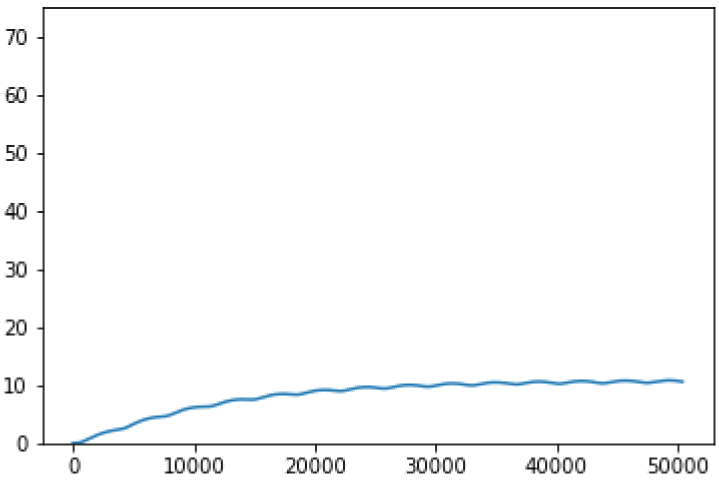
condition 49



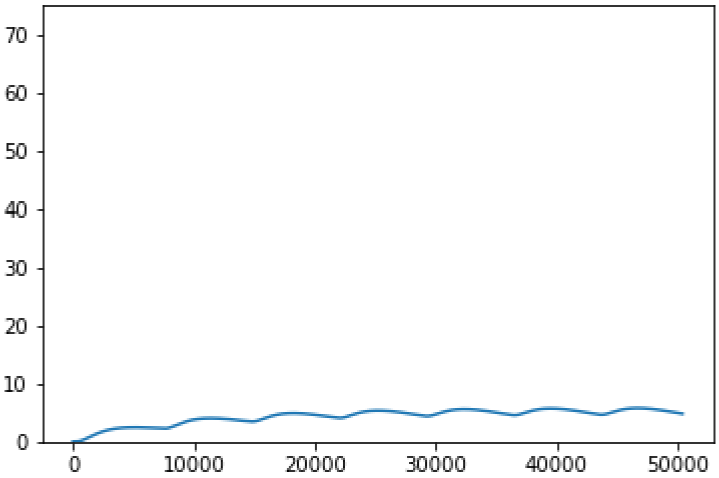
condition 50



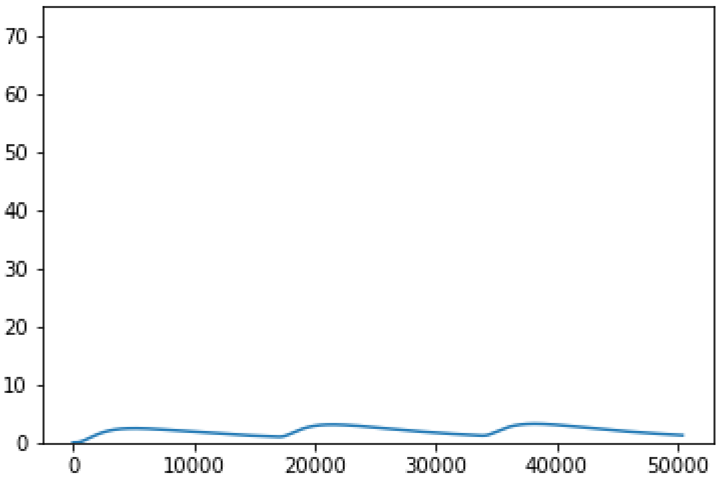
condition 51



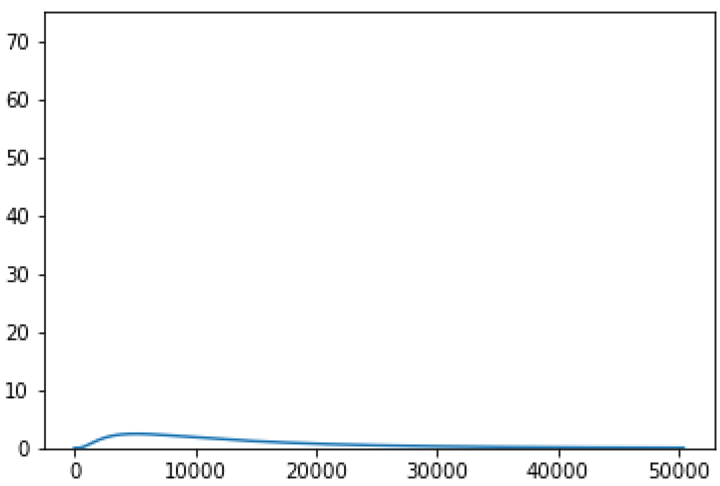
condition 52



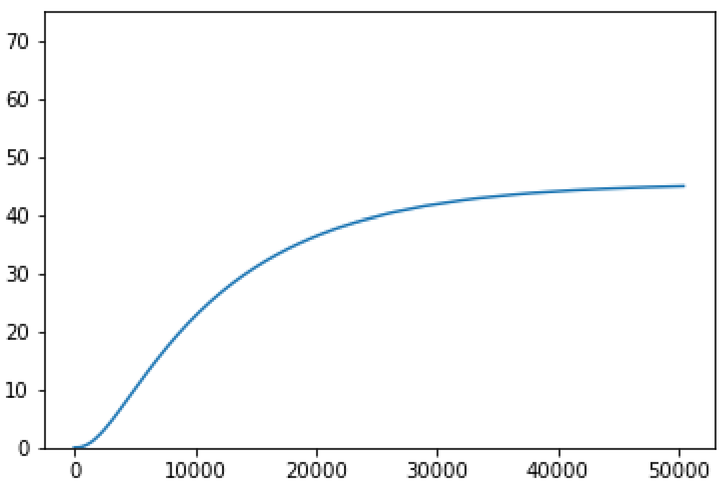
condition 53



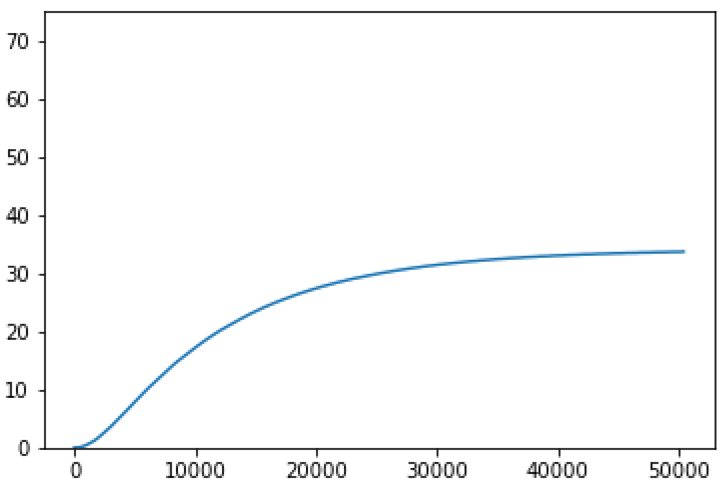
condition 54



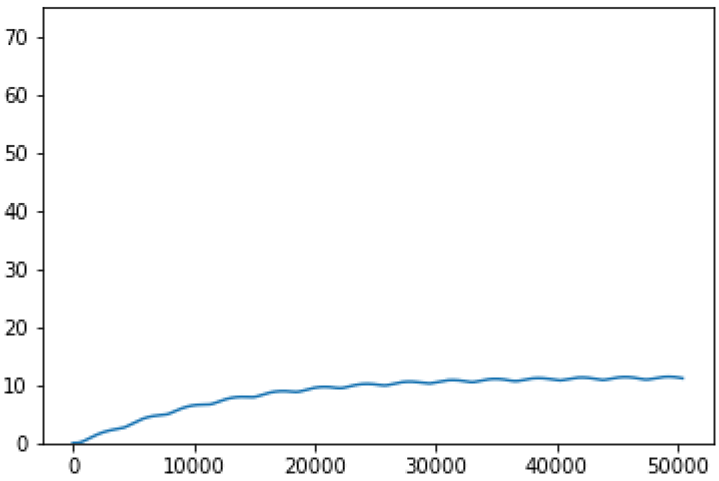
condition 55



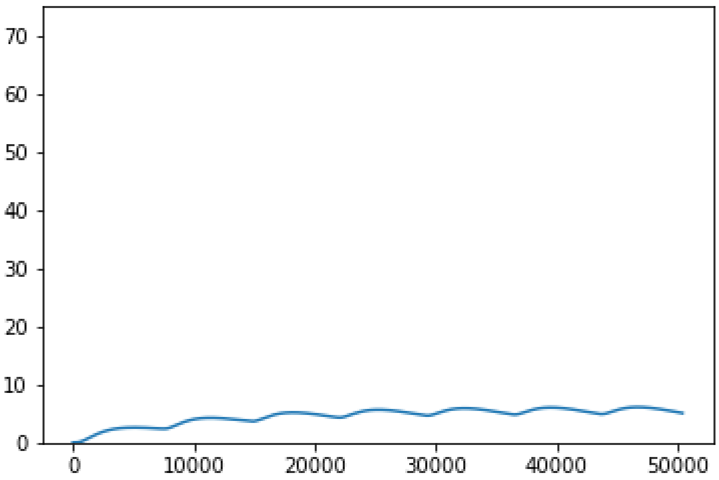
condition 56



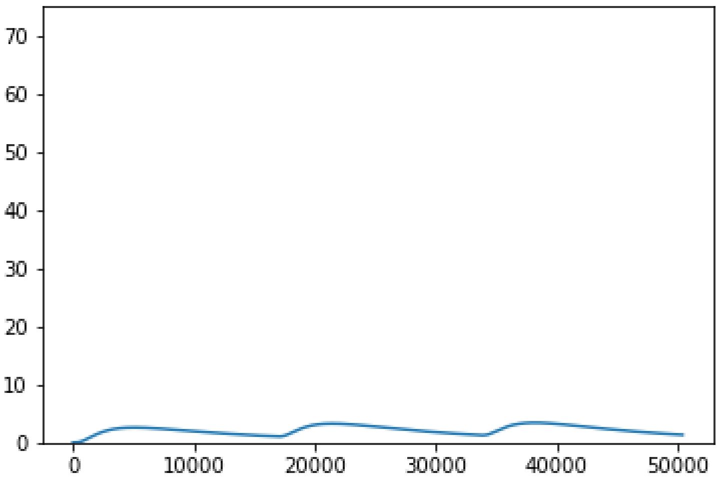
condition 57

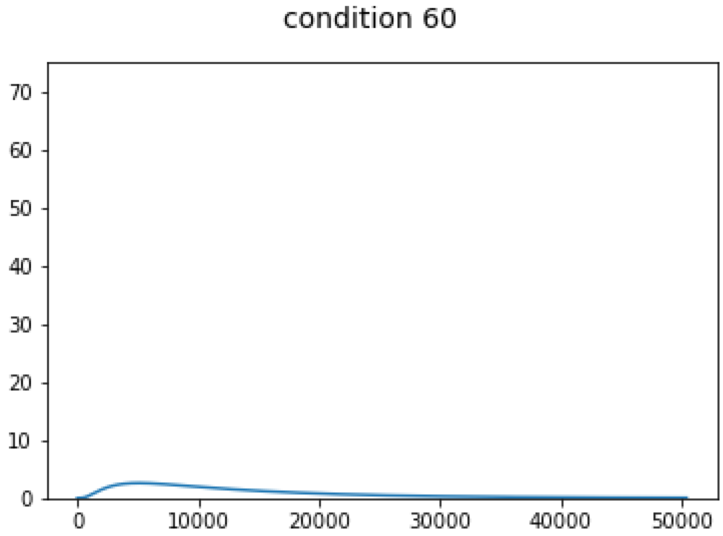


condition 58



condition 59




condition 60
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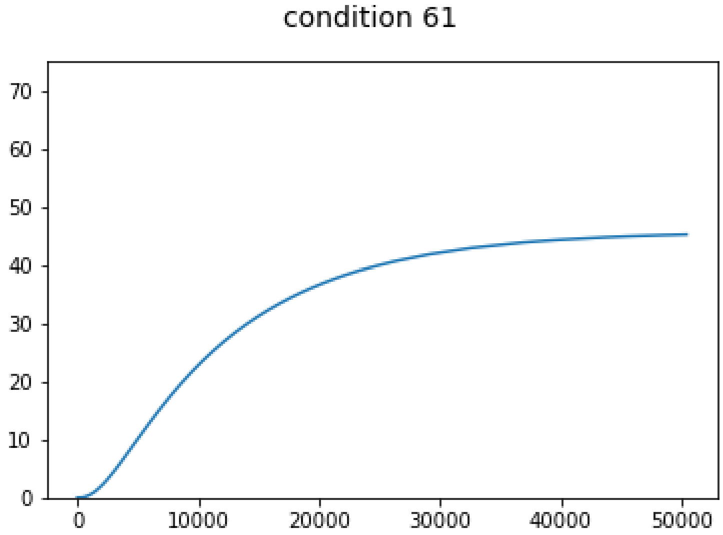
condition 61
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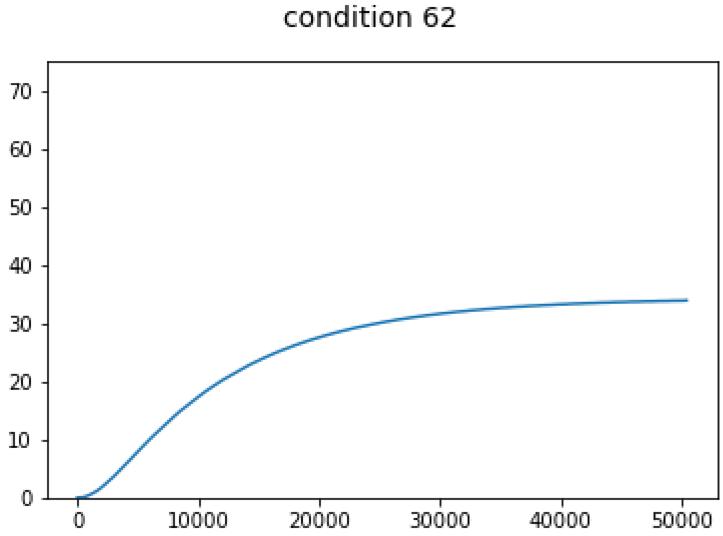
condition 62
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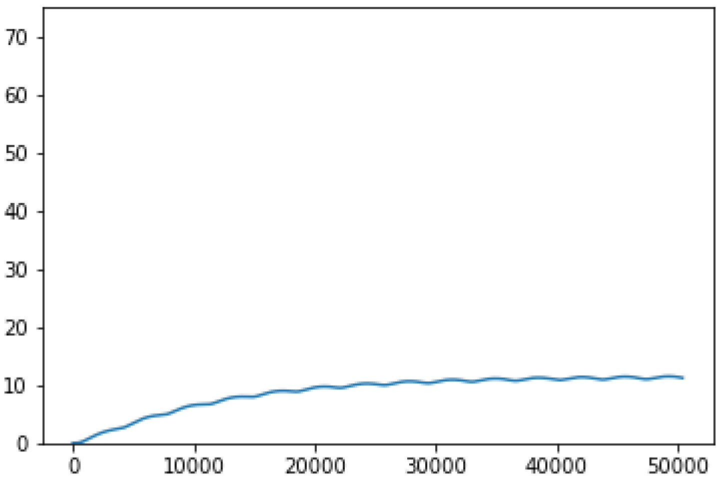
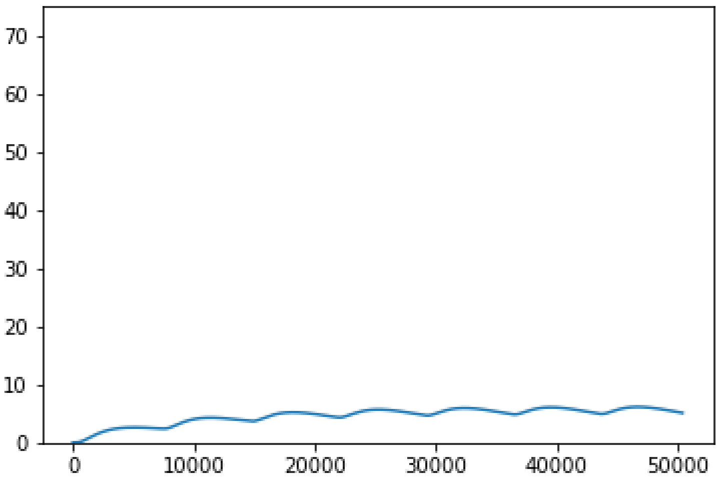
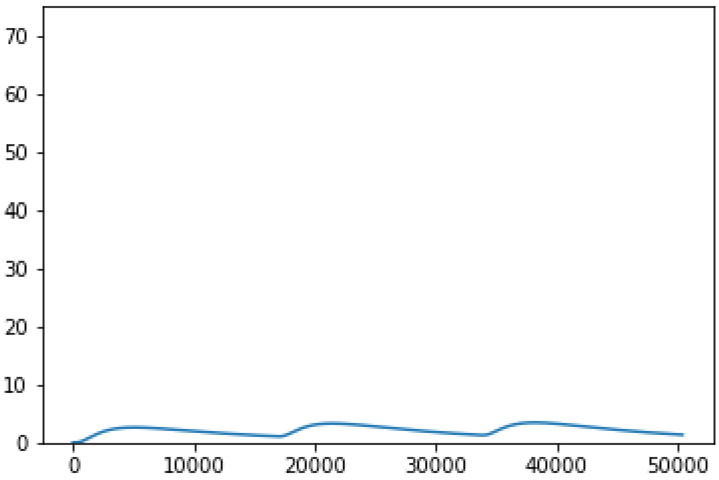
condition 63



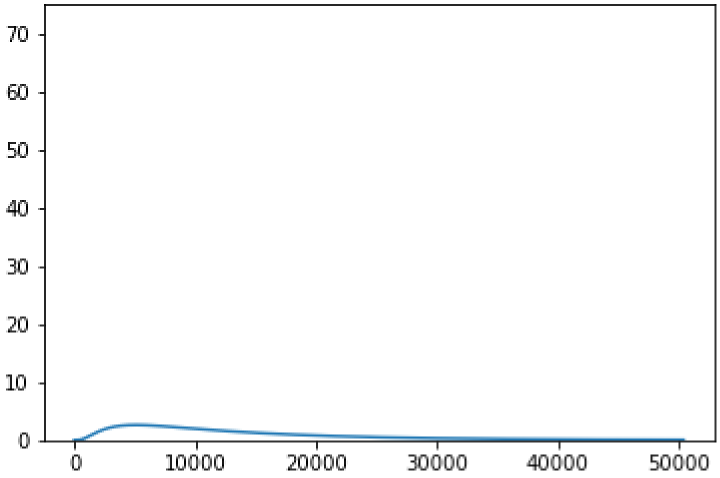
condition 64



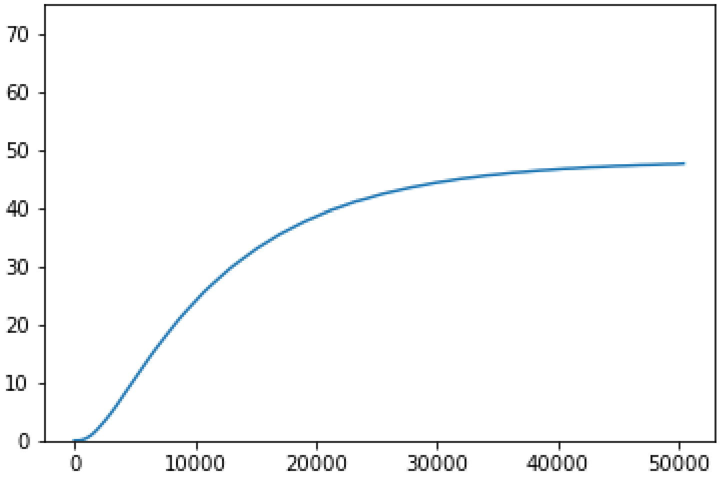
condition 65



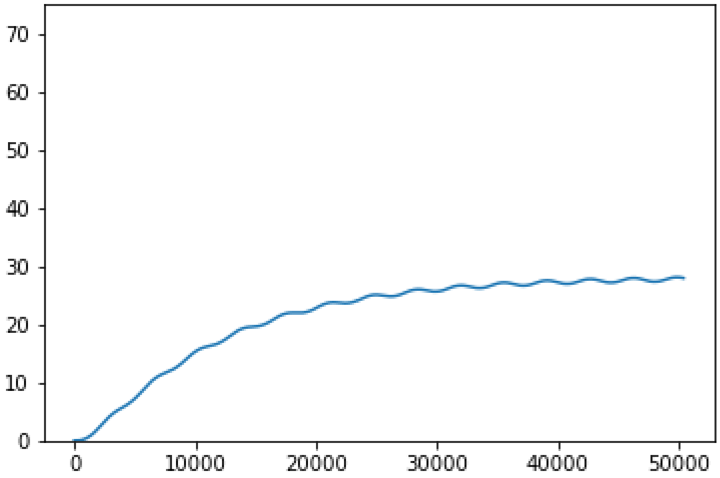
condition 66

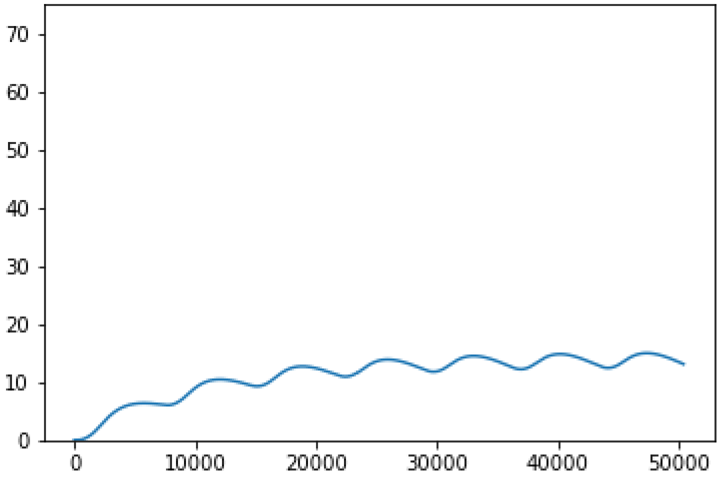


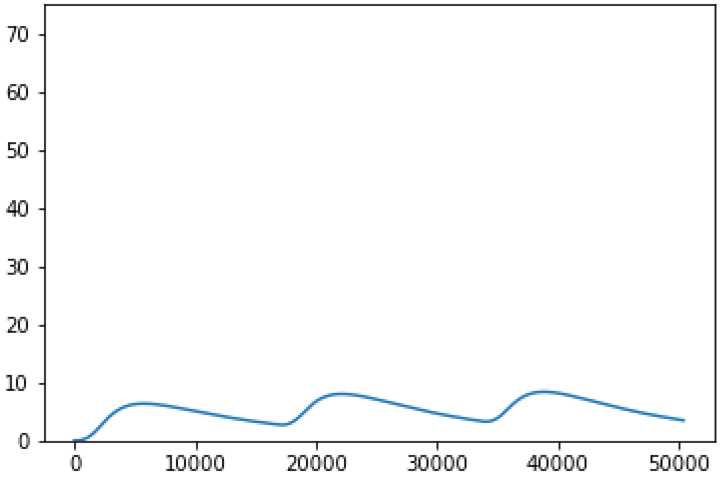
condition 67

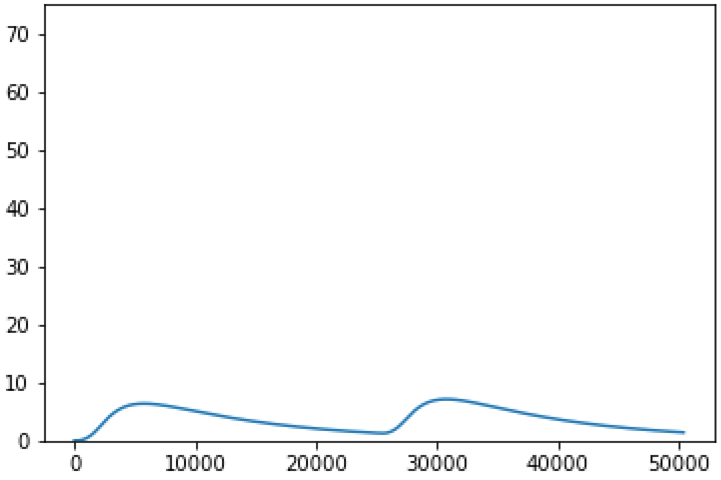


condition 68

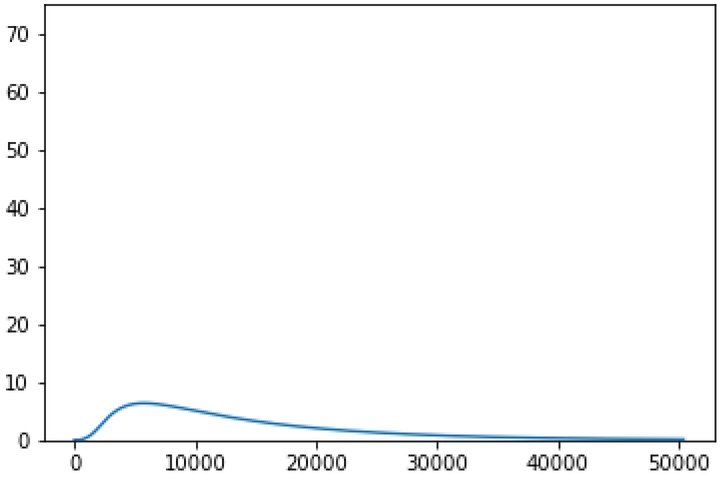



condition 69

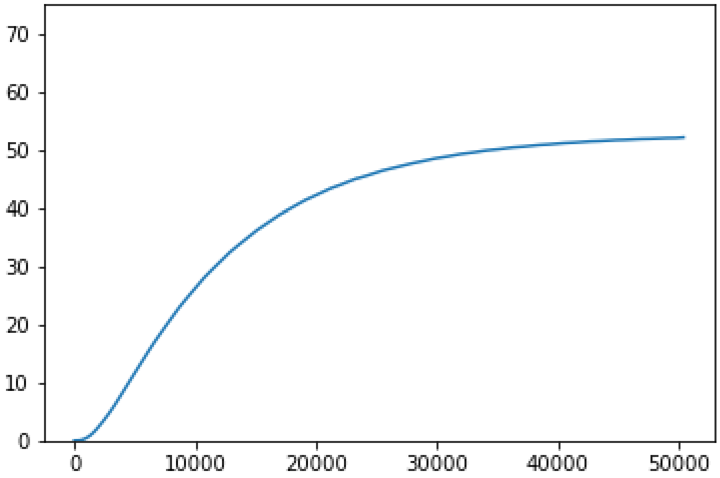

condition 70


condition 71

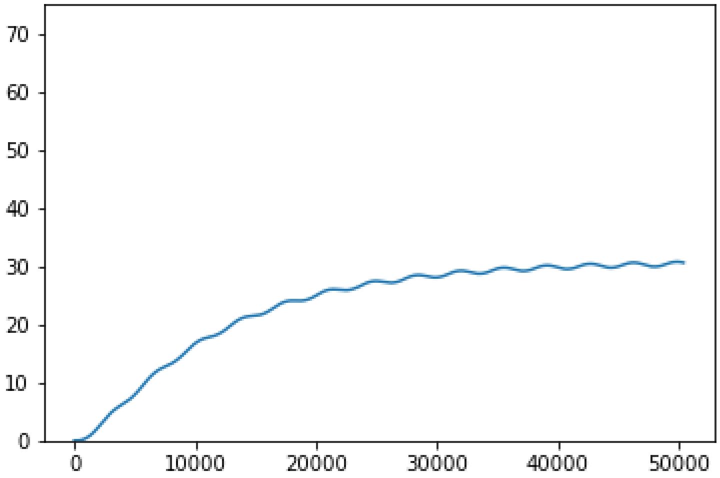
condition 72



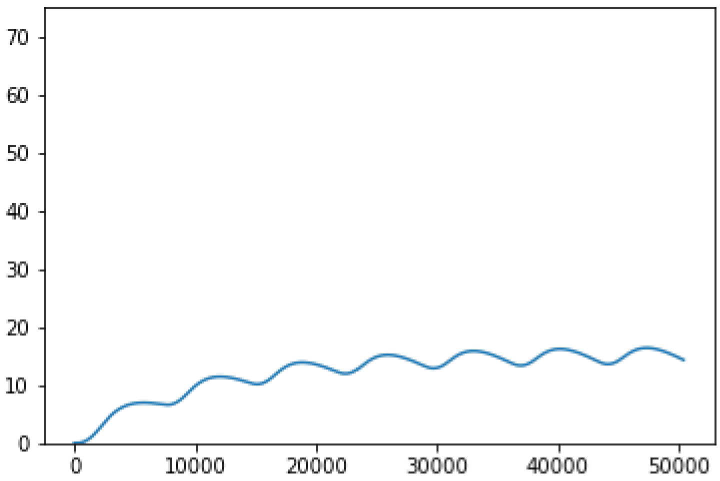
condition 73



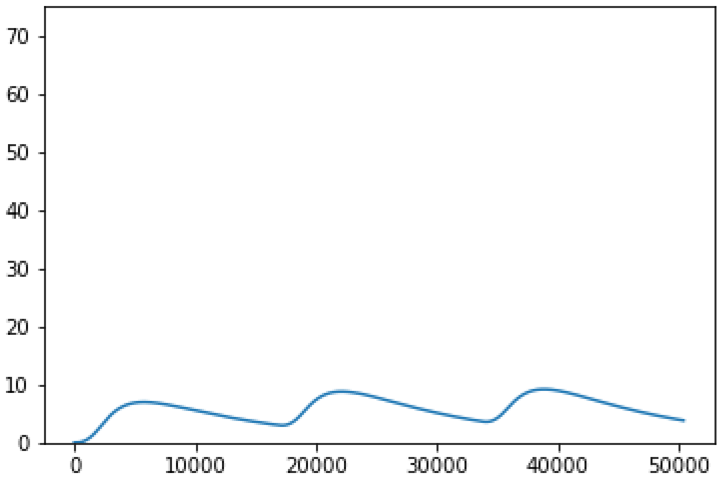
condition 74



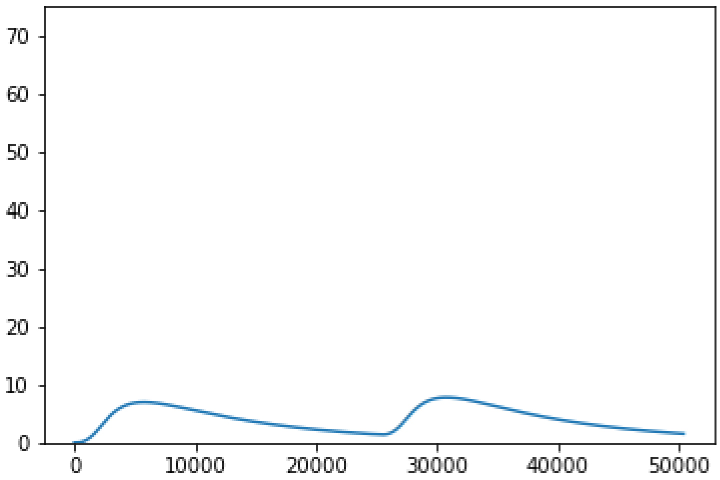
condition 75



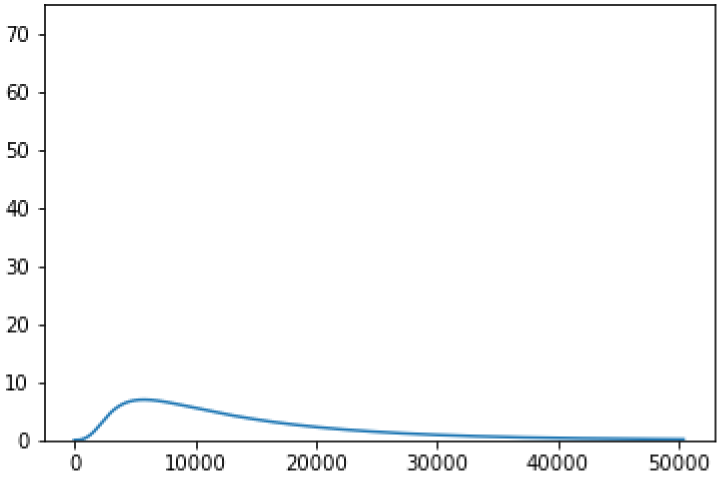
condition 76



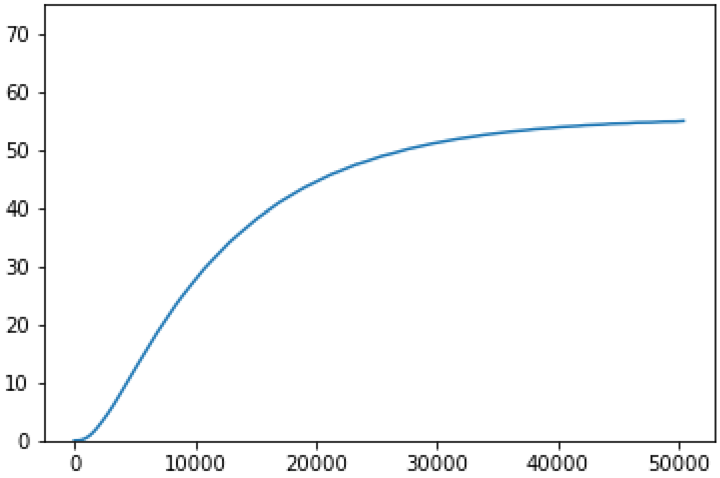
condition 77



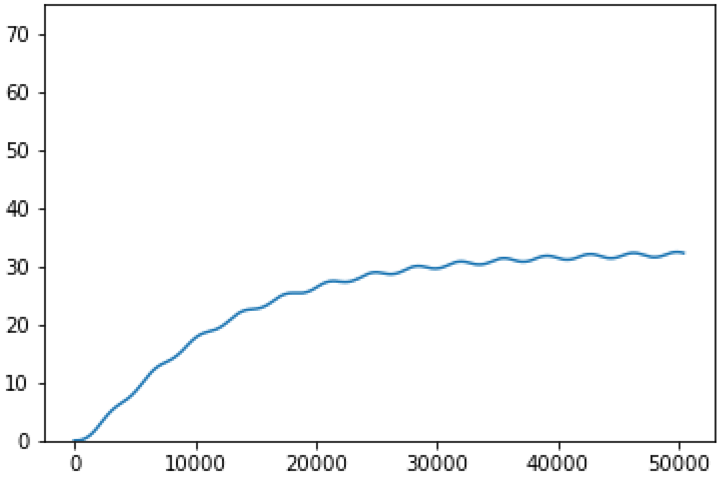
condition 78



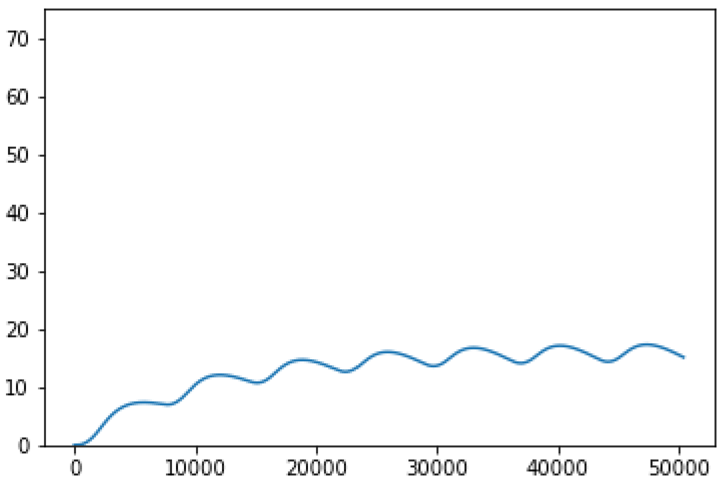
condition 79



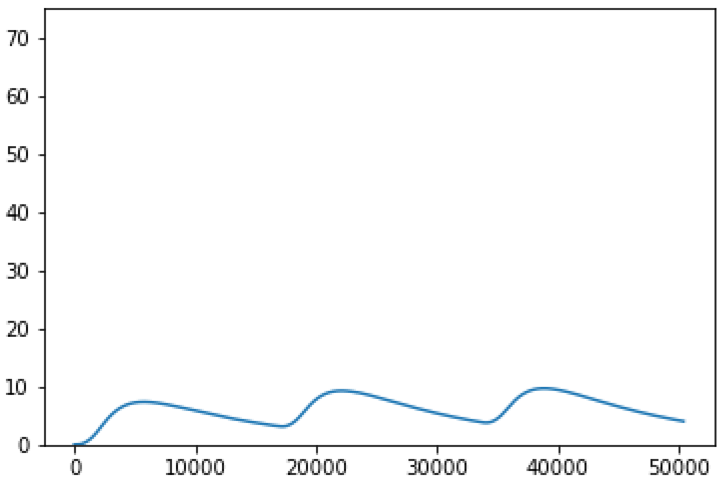
condition 80



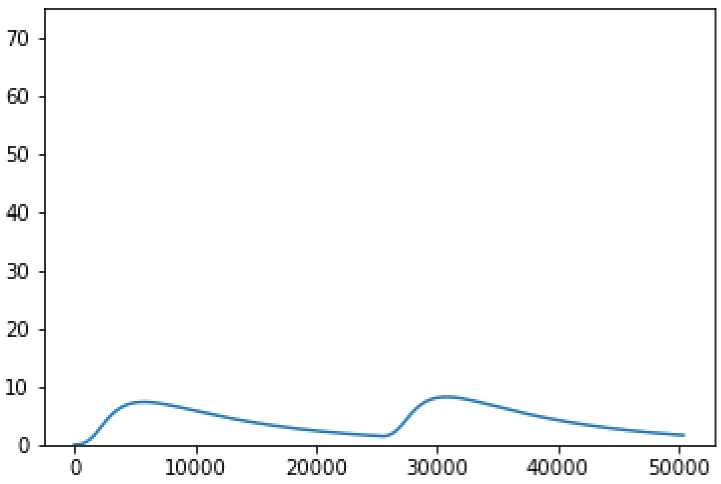
condition 81

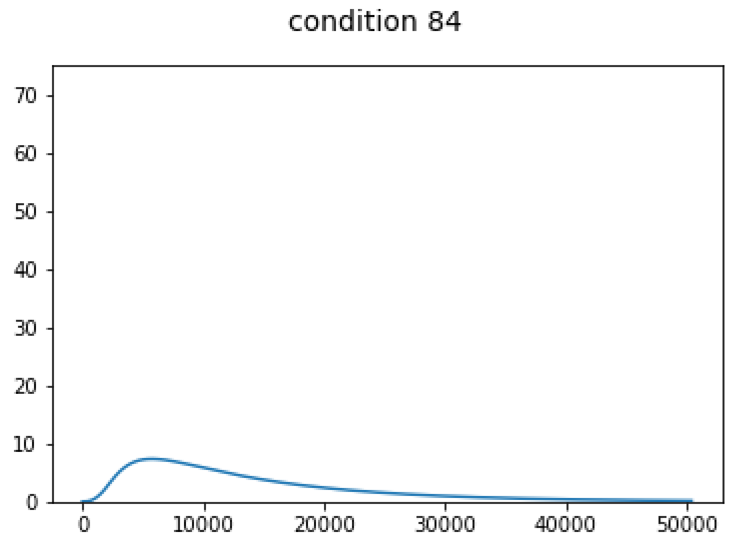


condition 82



condition 83




condition 84
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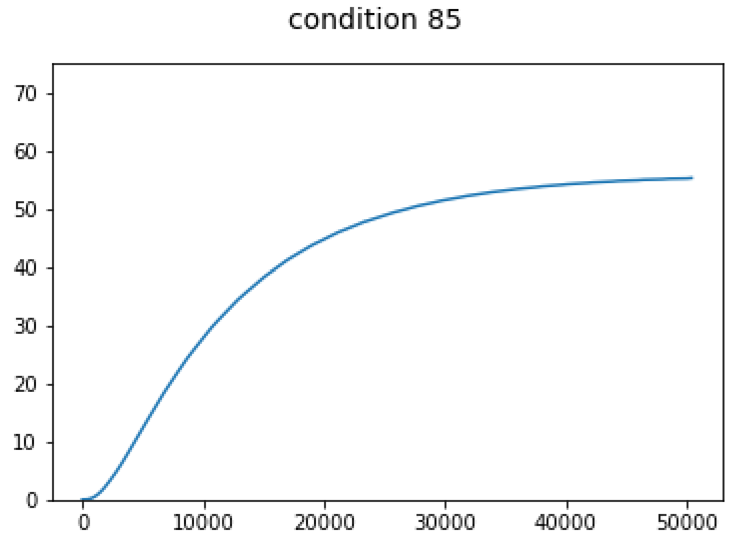
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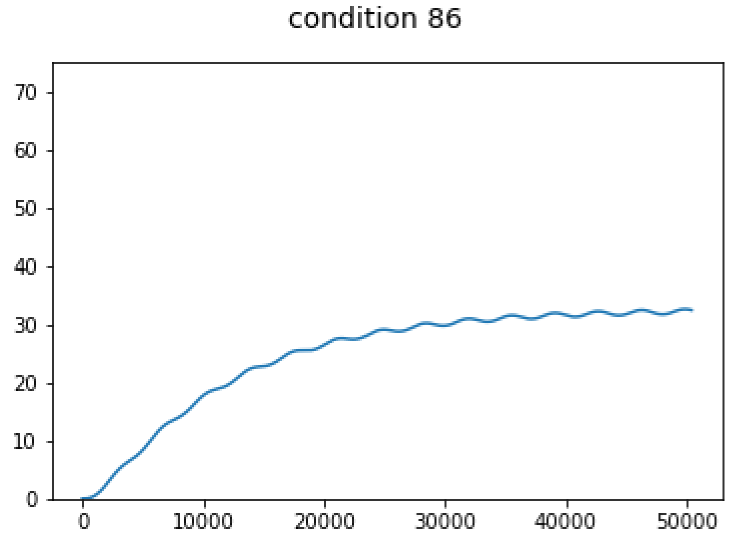
condition 86
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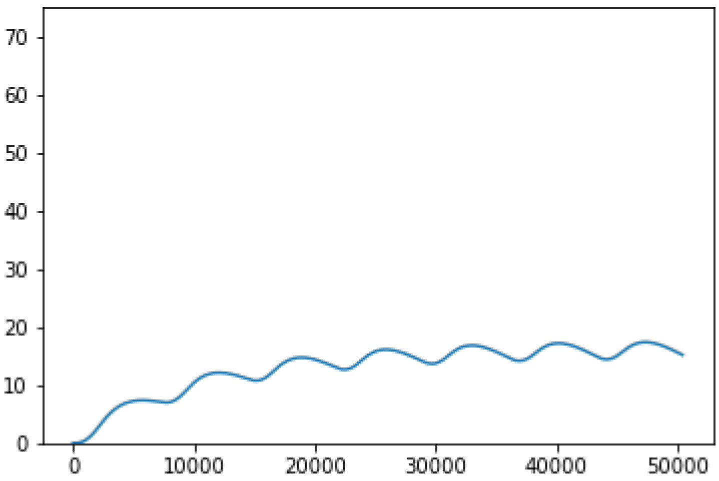
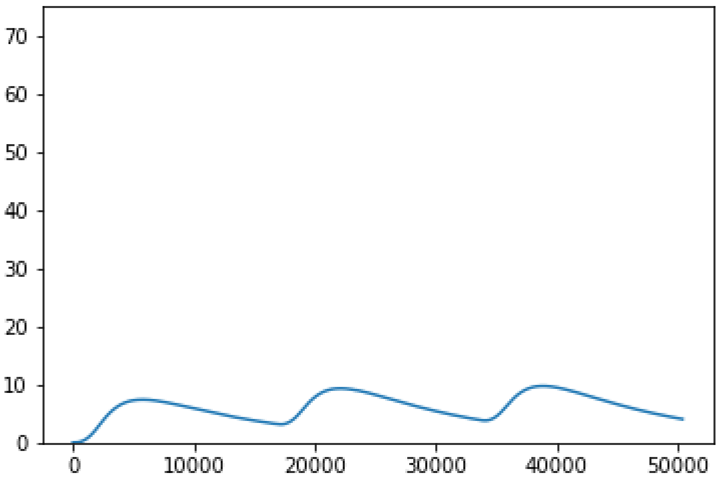
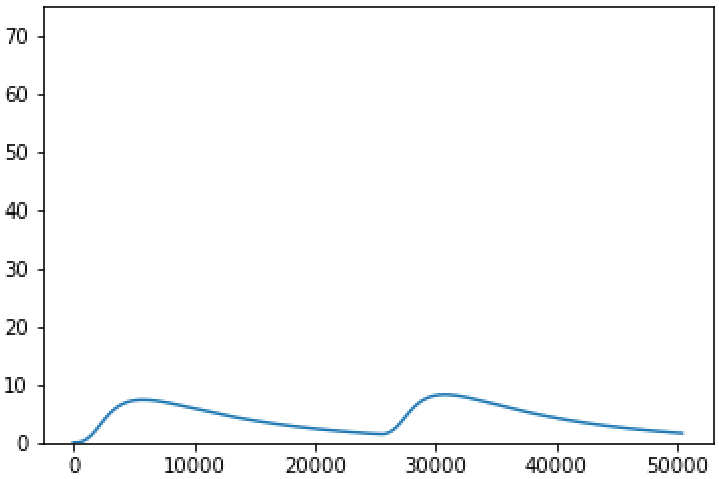
condition 87

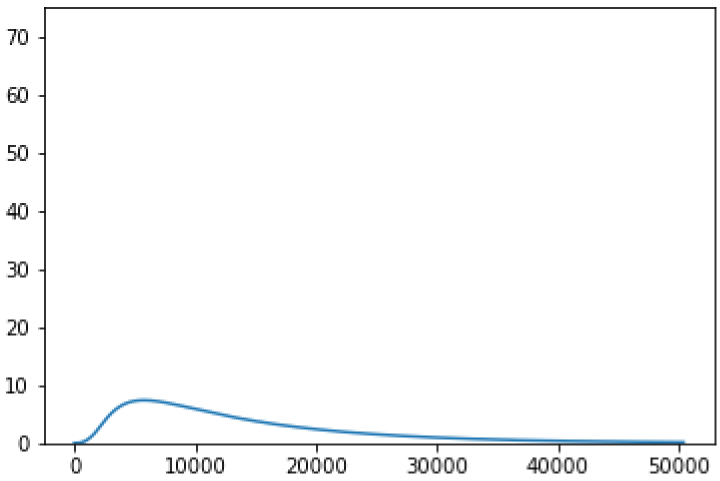


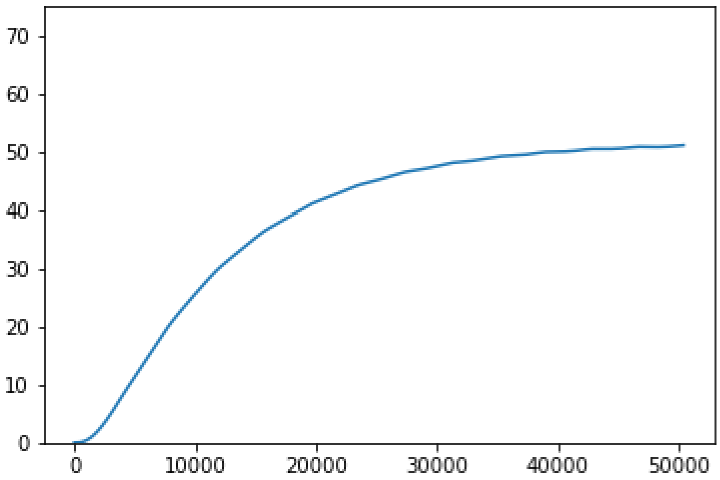
condition 88

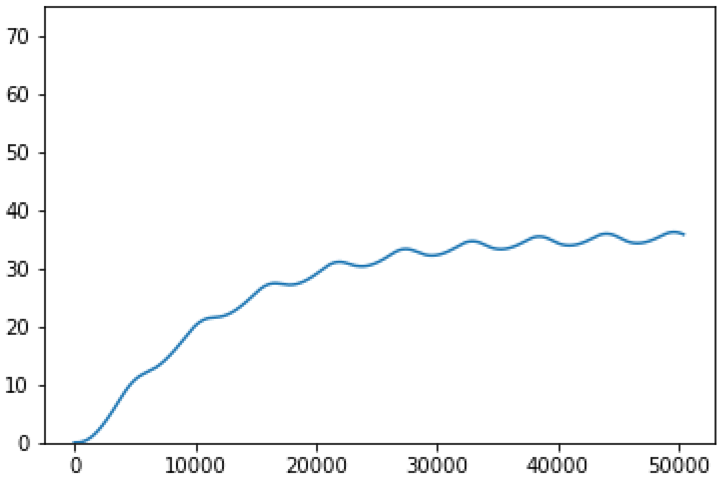


condition 89

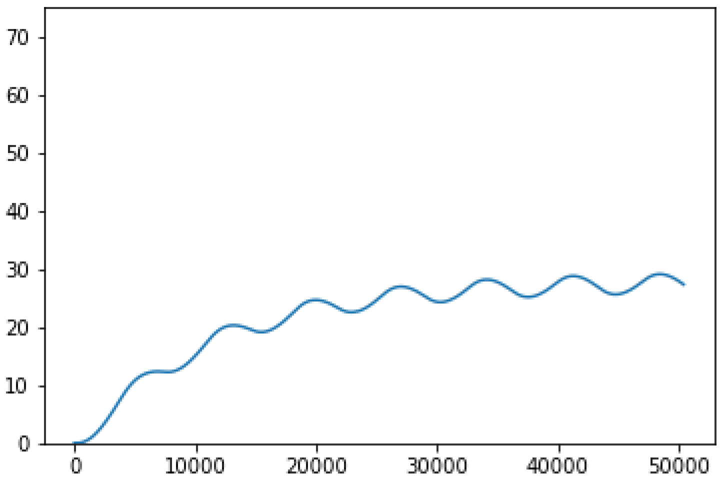



condition 90

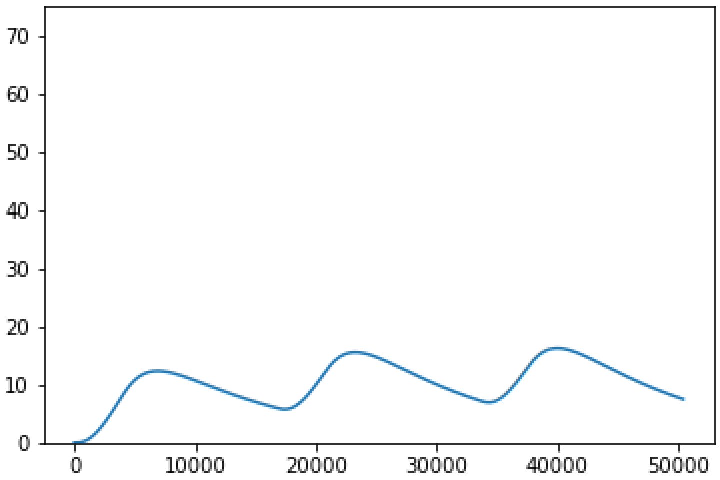

condition 91


condition 92

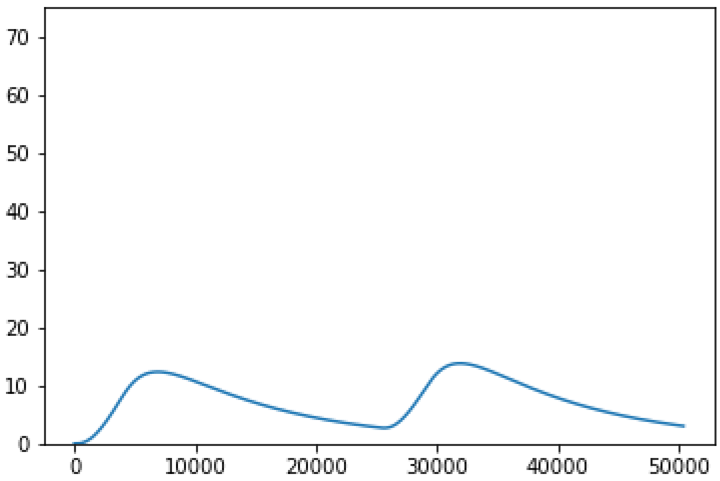
condition 93



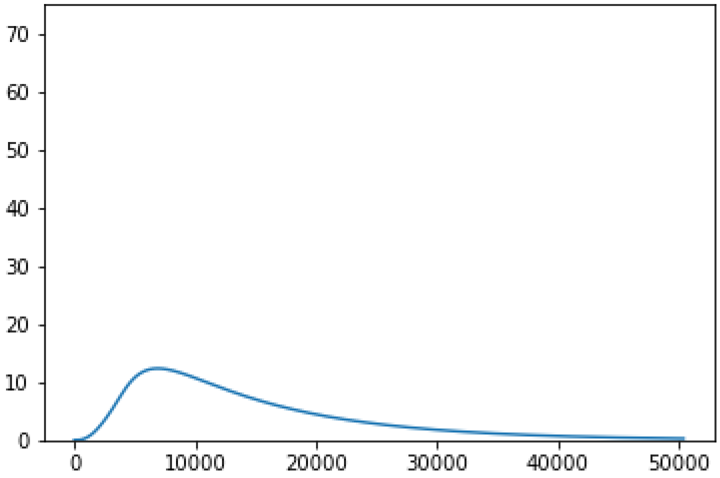
condition 94



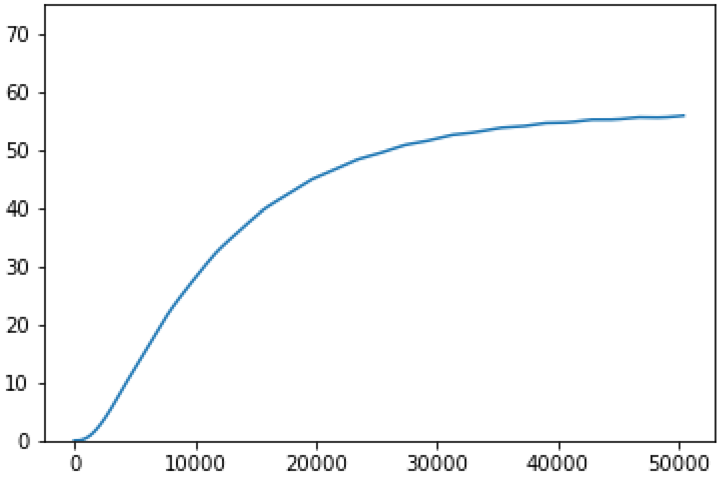
condition 95



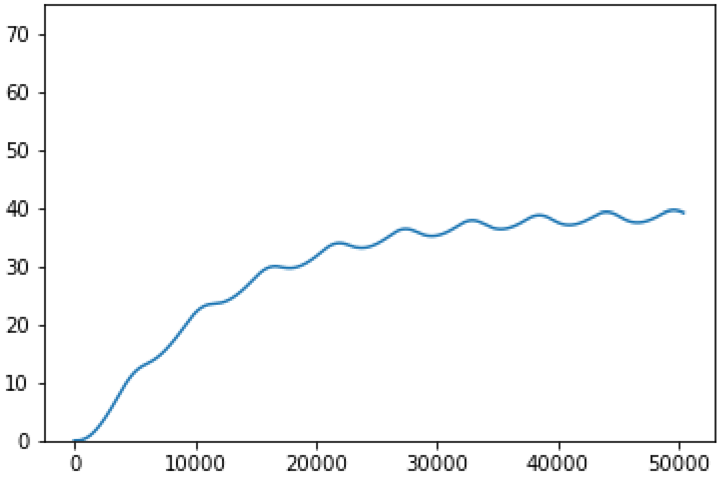
condition 96



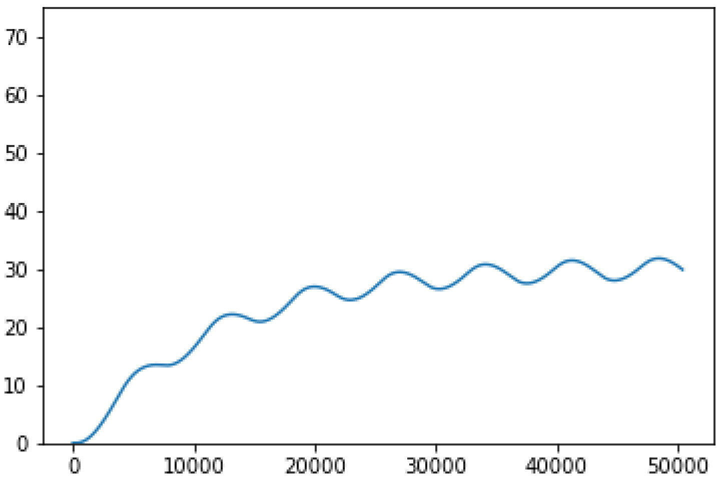
condition 97



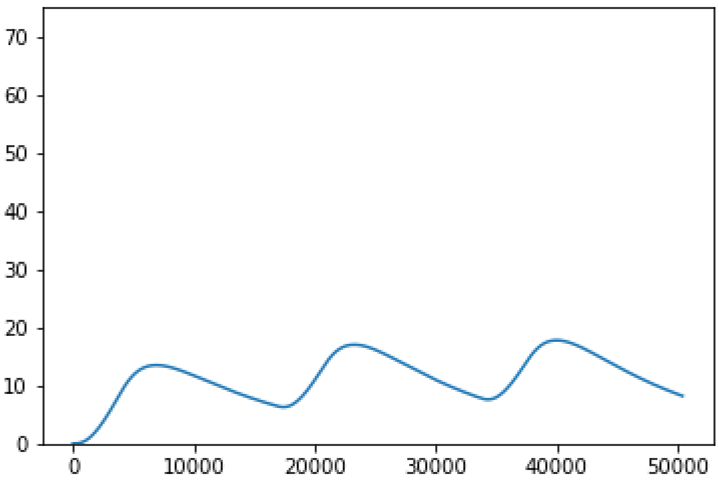
condition 98



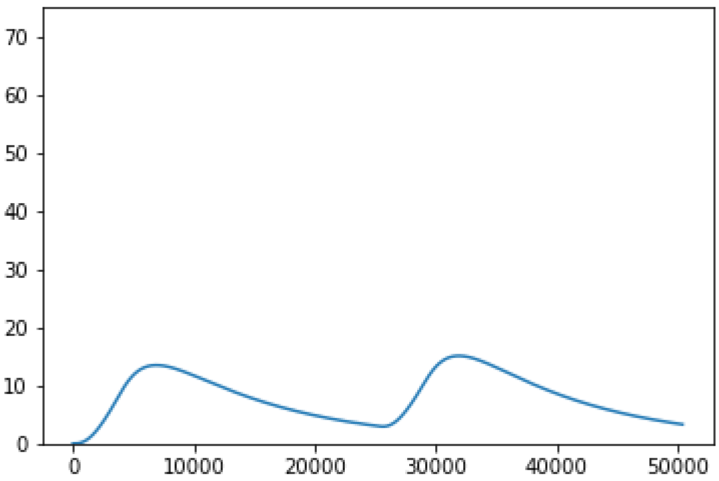
condition 99



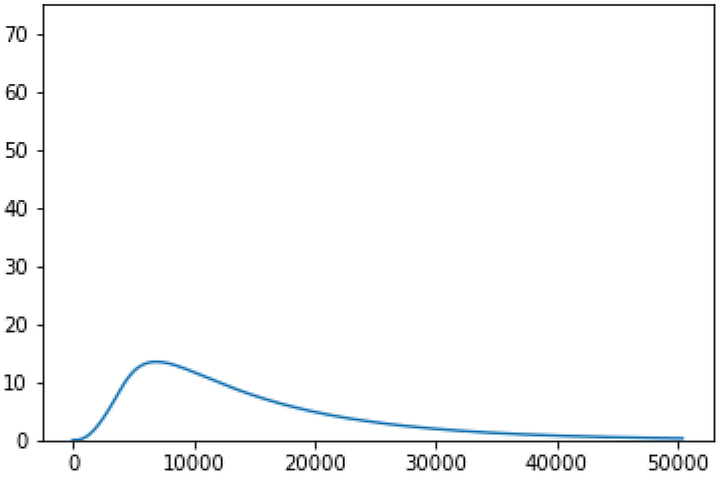
condition 100



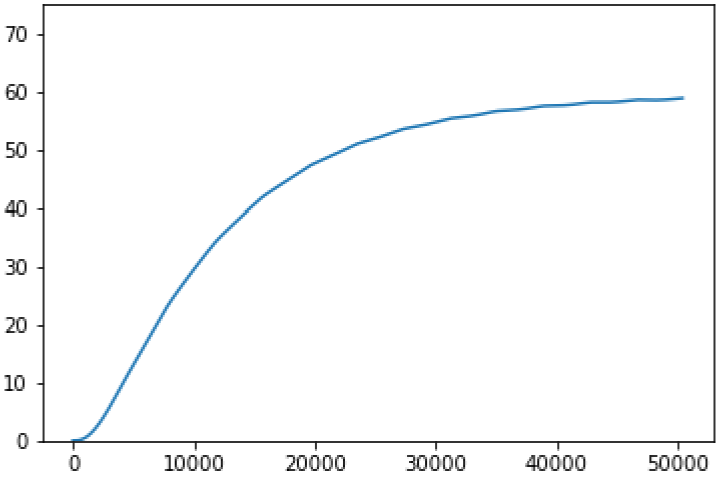
condition 101



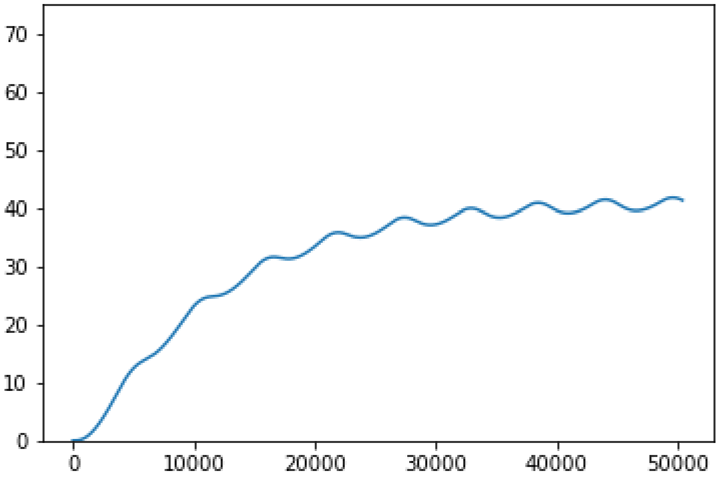
condition 102



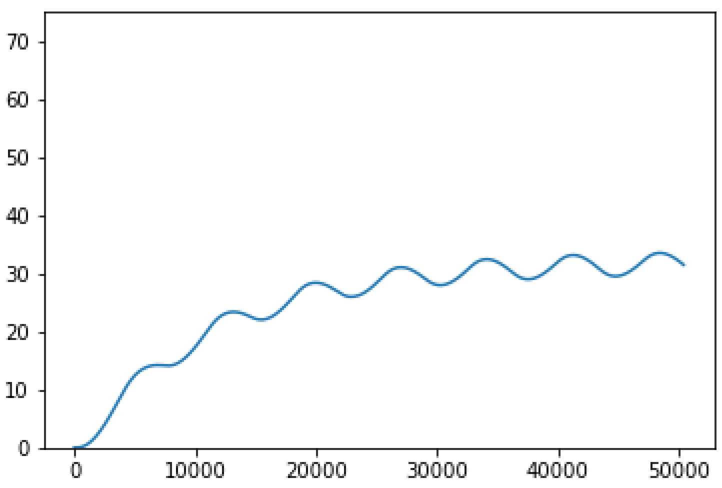
condition 103



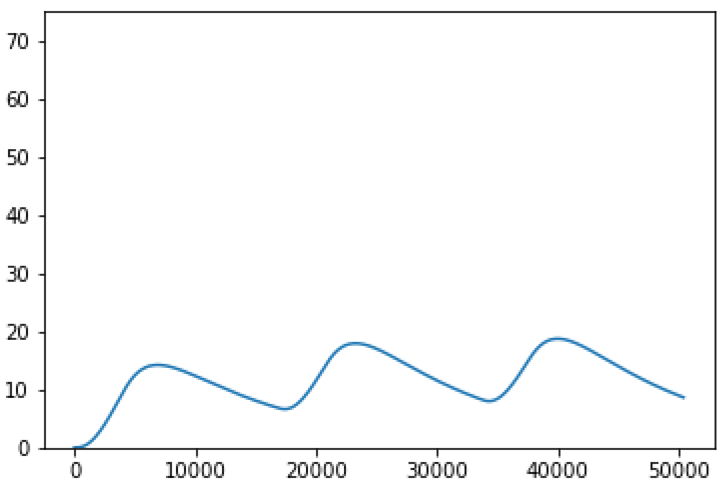
condition 104



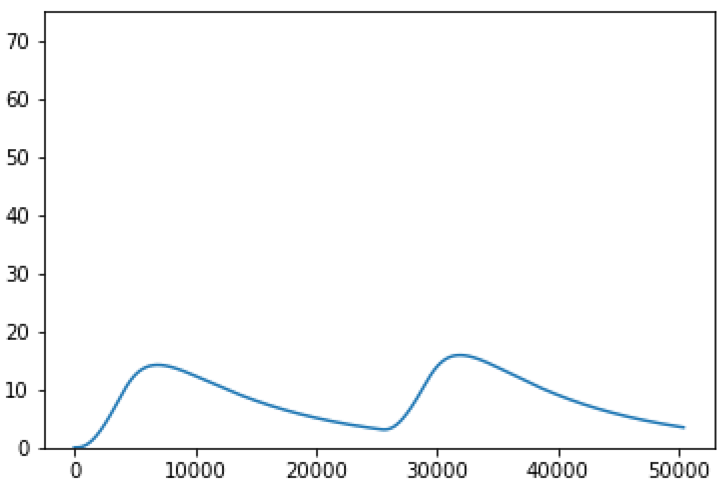
condition 105

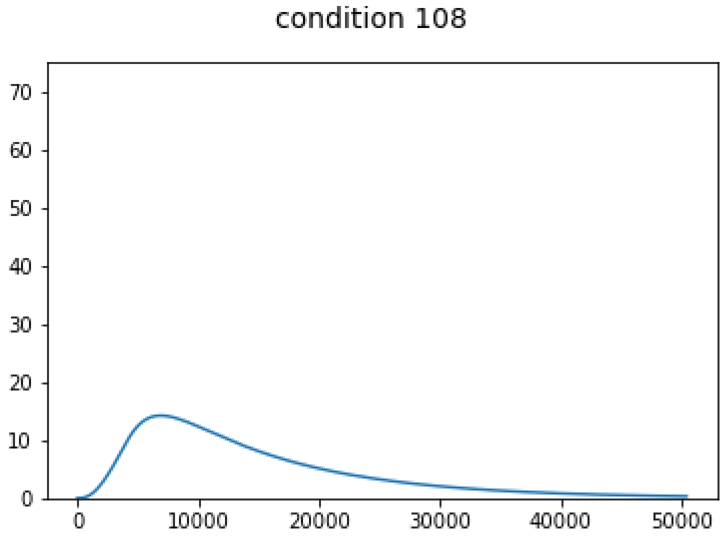


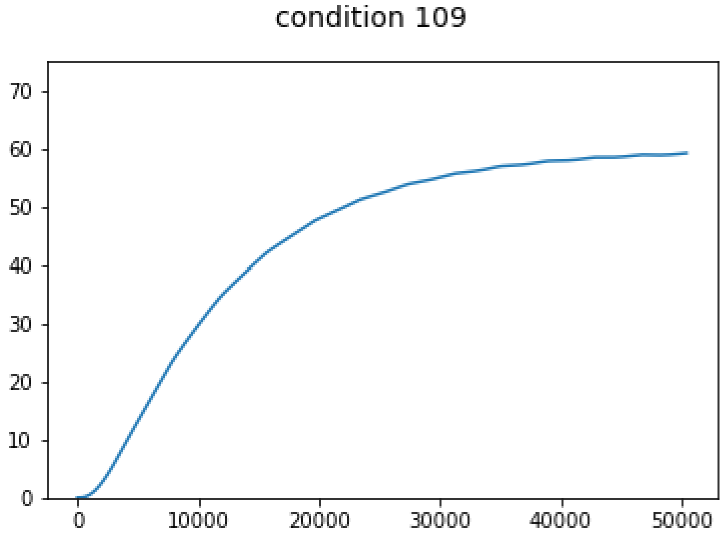
condition 106

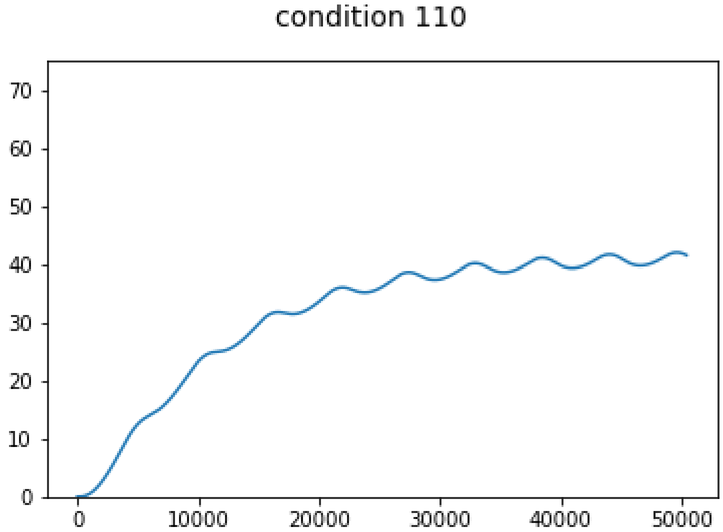


condition 107

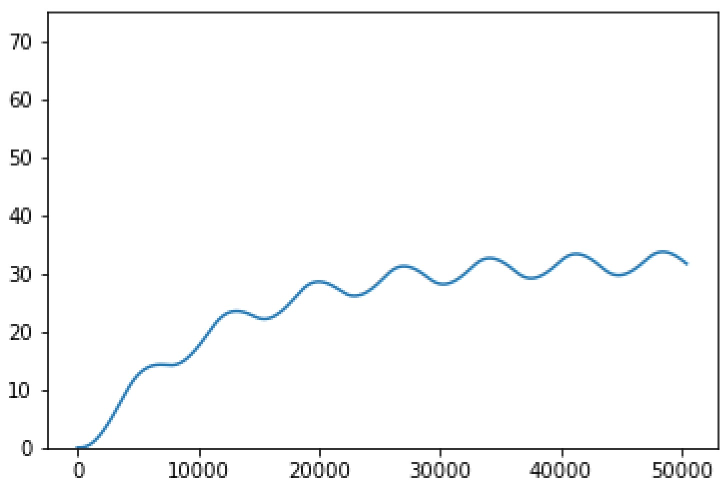



condition 108

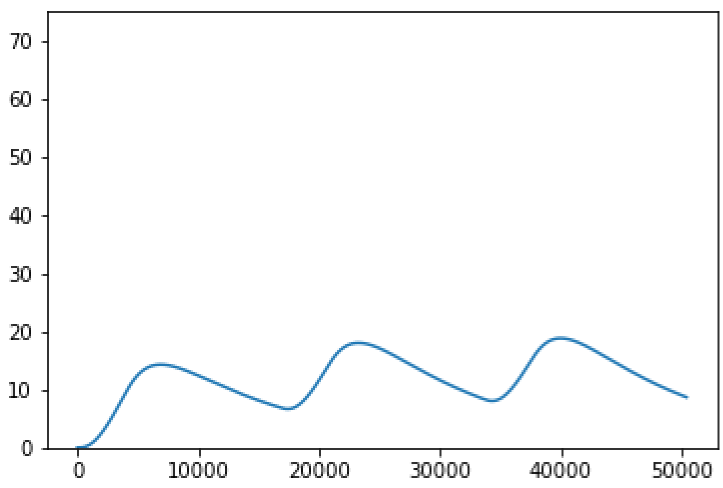

condition 109


condition 110

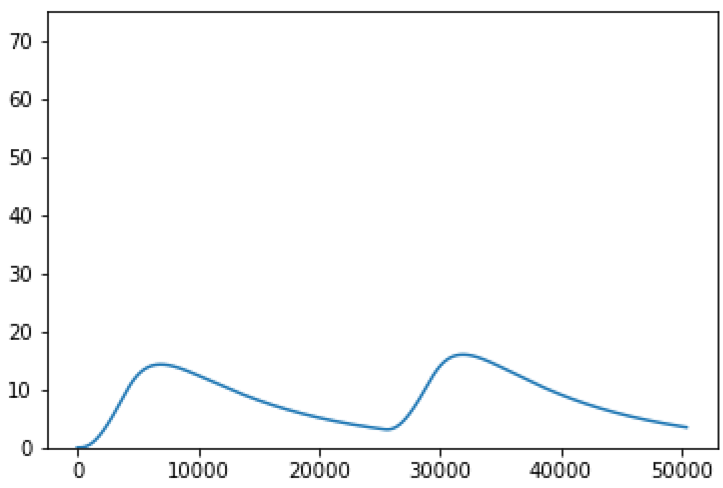
condition 111



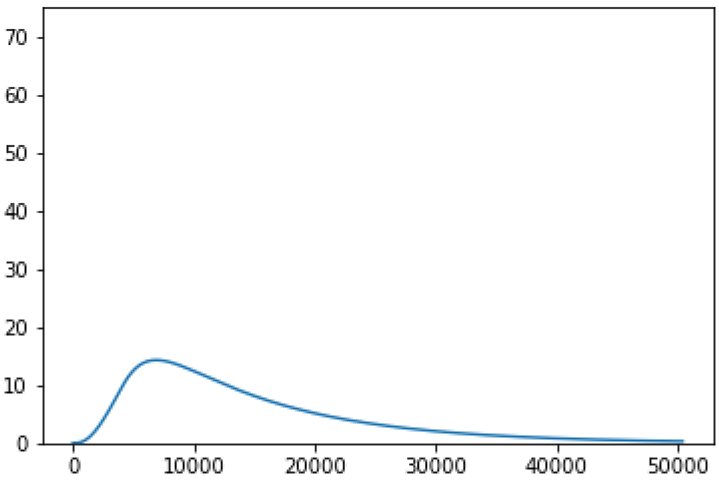
condition 112



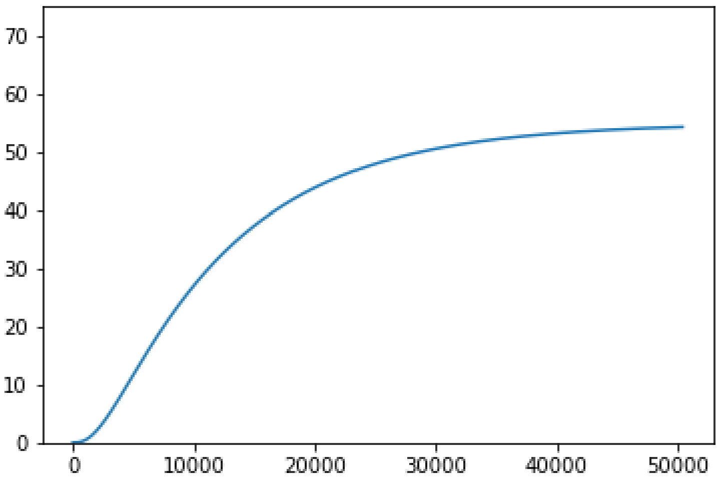
condition 113



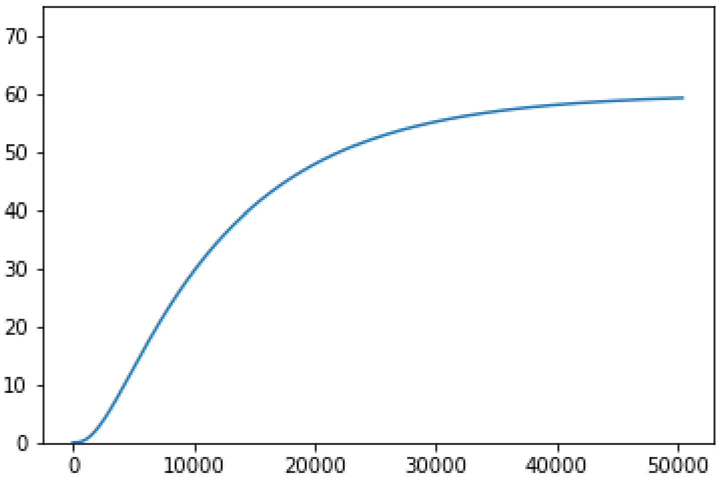
condition 114

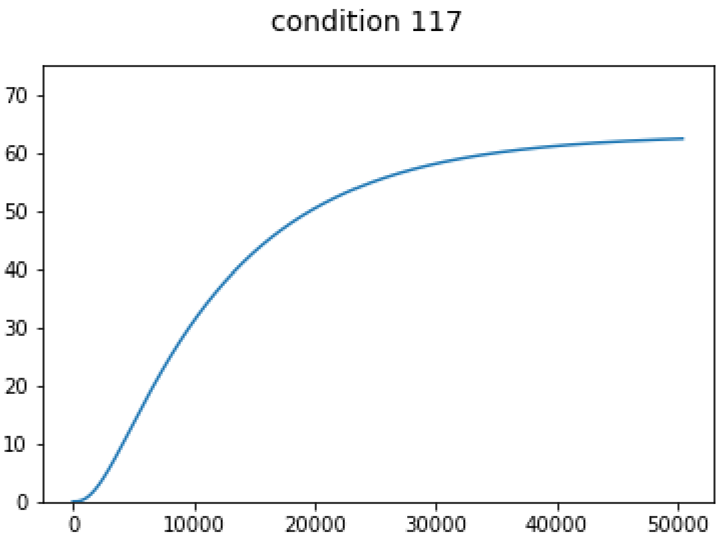


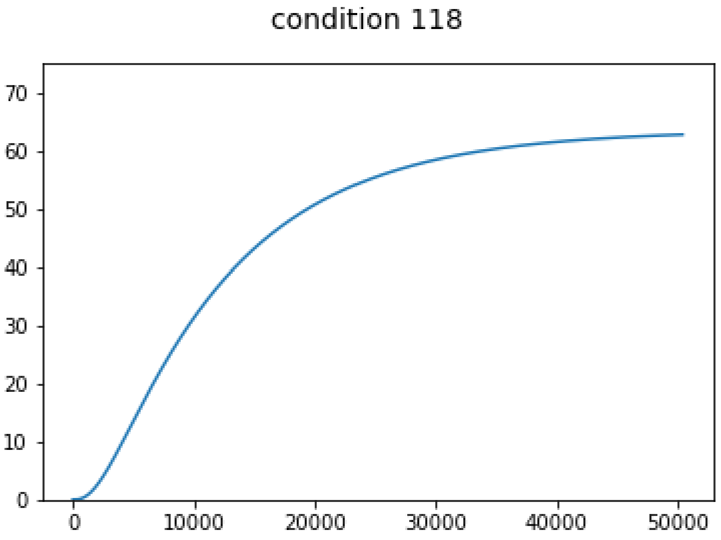
condition 115



condition 116




condition 117


condition 118

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In [ ]:
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