

> Dry-Eye
 ▾ MasterProject
 > Images
 > PICTURES
 aa29313-16.pdf
 ds9
 firsttry.zip
 howtouseAARTFAACandTra
 Notes 19_10_2017
 Notes_13_10_2017
 Notes_27_10_1017
 Notes_27_10_1017~
 send.zip
 send2.zip
 WSCLEANOPTIONS
 > Projects_year1_master
 ▾ Projects_year2_master
 > Applied_Machine
 ▾ Numerical_Algorithms
 > Chapter1
 ▾ Homework1
 exc1.pdf
 exc1.py
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 exc3.py
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 homework_assignme
 Scientific_Computing
 ▾ UVA_AML17
 > .git
 > src
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 > week_2
 .gitignore
 LICENSE
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exc1.py Settings exc3.py exc3turnin.py

```

12
13 # Function returning Centered solution
14 def cFD(x,h):
15     return (Fx(x+h) - 2 * Fx(x) + Fx(x-h))/(h**2)
16
17 # Function returning Forward solution
18 def fFD(x,h):
19     return (Fx(x+(2*h)) - 2 * Fx(x + h) + Fx(x))/(h
20
21 # Function calculating error Centered
22 def errorcFD(x,h):
23     return( abs(cFD(x,h) - exact(x)))
24
25 # Function calculating error Forward
26 def errorfFD(x,h):
27     return( abs(fFD(x,h) - exact(x)))
28
29 # Intializing values
30 x = 0.5
31 cf = []
32 ff = []
33 xlist=[]
34 exactz = []
35
36 # Looping over specified range (1 till 1*10^-16)
37 for h in range(0,17):
38     h = -1*h
39     i = 10**h
40     cf.append(errorcFD(x,i))
41     ff.append(errorfFD(x,i))
42     exactz.append(exactsolution(x))
43     xlist.append(i)
44
45 # Plot everything
46 plt.plot(xlist,cf, label = "Centered FD")
47 plt.plot(xlist,ff, label = "Forward FD")
48 cf = np.array(cf)
49 ff = np.array(ff)
50 plt.yscale('log')
51 plt.xscale('log')
52 plt.xlabel("h",fontsize=20)
53 plt.ylabel("Error",fontsize=20)
54 plt.tick_params(axis='both', labelsize=15)
  
```