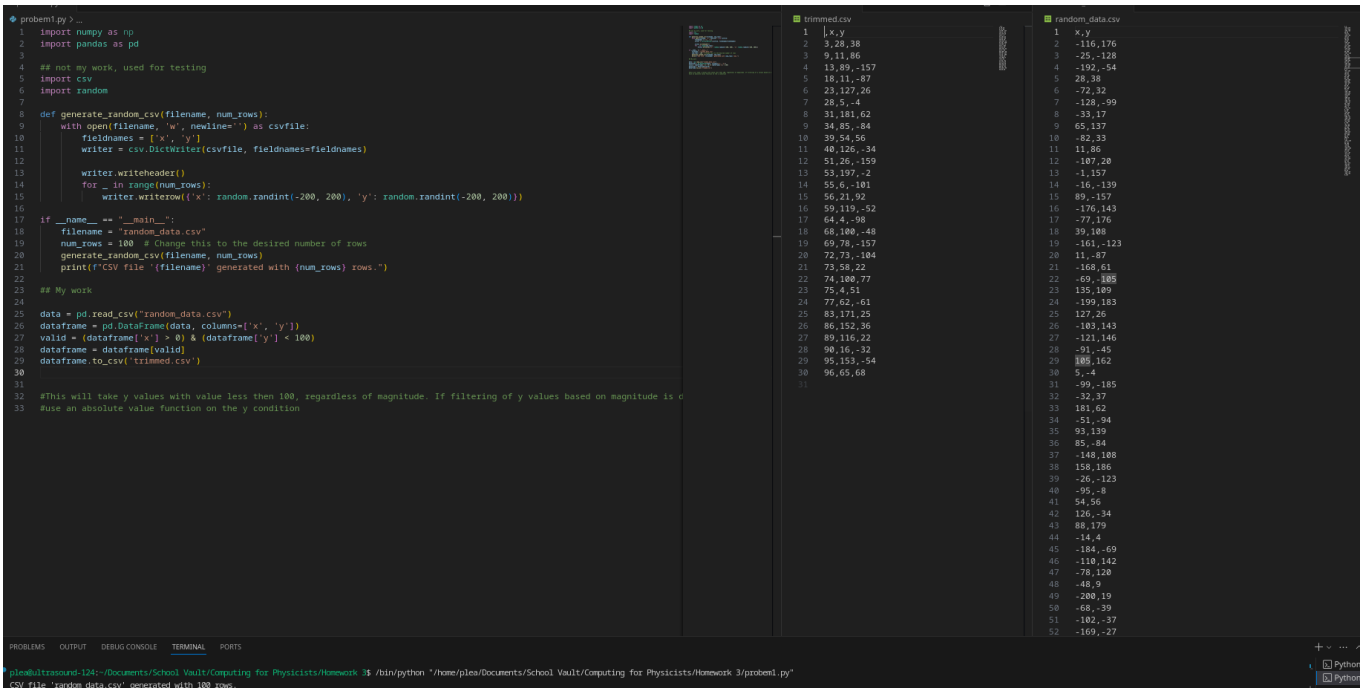
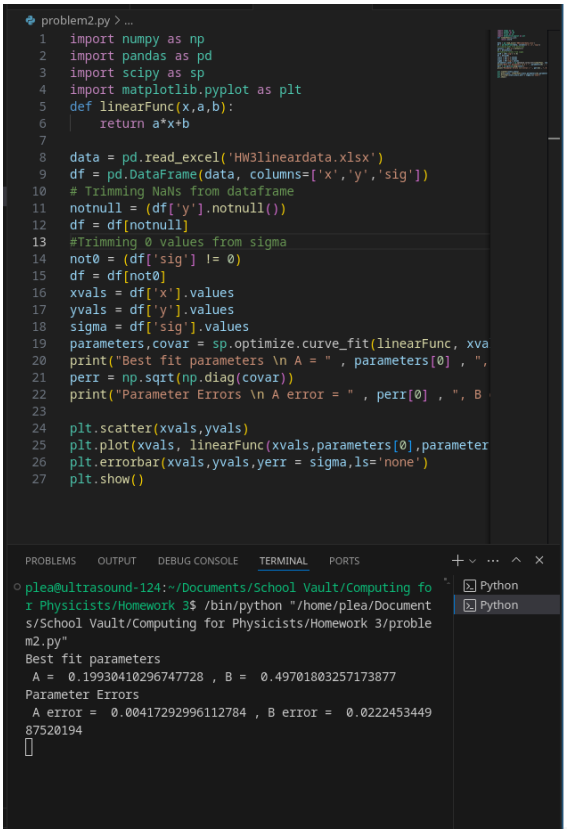
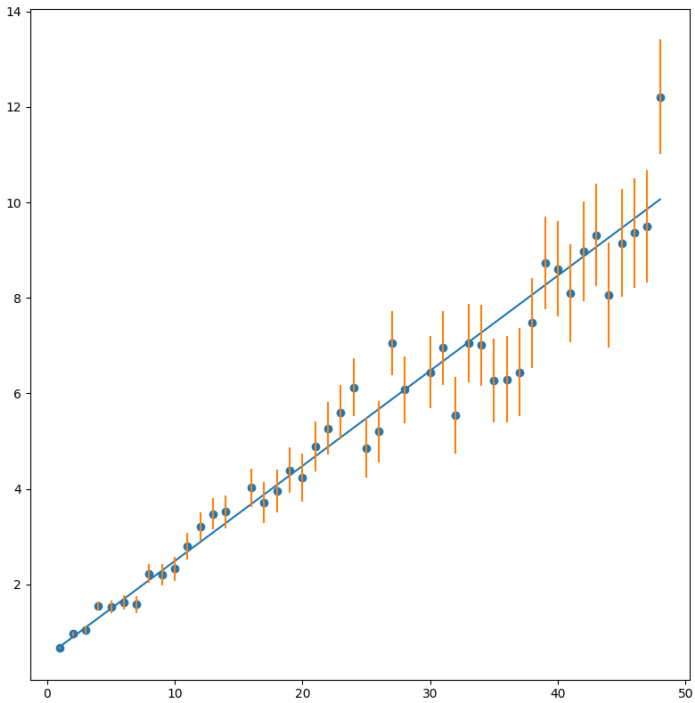
Problem 1



Problem 2





Problem 3

problem5.py problem4.py problem3.py

problem3.py > ...

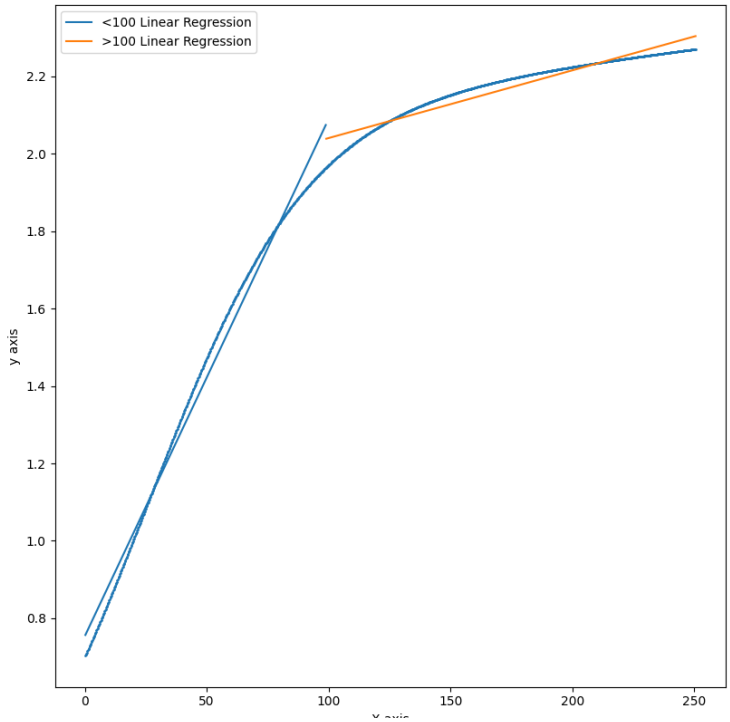
```python
import matplotlib.pyplot as plt
import numpy as np
import scipy as sp
import pandas as pd
def linearFunc(x,a,b):
    return a*x+b

data = pd.read_excel('lin2.xlsx')
df = pd.DataFrame(data)
xvals = df.iloc[:,0].values
yvals = df.iloc[:,1].values

x = np.where(np.logical_and(xvals>= 99, xvals<= 101))[0]

xvals2 = xvals[x[0]:]
yvals2 = yvals[x[0]:]
maxx = x[0].argmax()
xvals1 = xvals[:x[maxx]]
yvals1 = yvals[:x[maxx]]

parameters = np.polyfit(xvals1,yvals1,1)
parameters1 = np.polyfit(xvals2,yvals2,1)

plt.scatter(xvals,yvals, s=1)
plt.plot(xvals1, linearFunc(xvals1,parameters[0],paramet
plt.plot(xvals2, linearFunc(xvals2,parameters1[0],parame
plt.xlabel("X axis")
plt.ylabel("y axis")
plt.legend()
plt.show()
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

Python

Python

```
lea@ultrasound-124:~/Documents/School Vault/Computing fo
 Physicists/Homework 3$ /bin/python "/home/plea/Document
/School Vault/Computing for Physicists/Homework 3/proble
3.py"
```



Problem 4

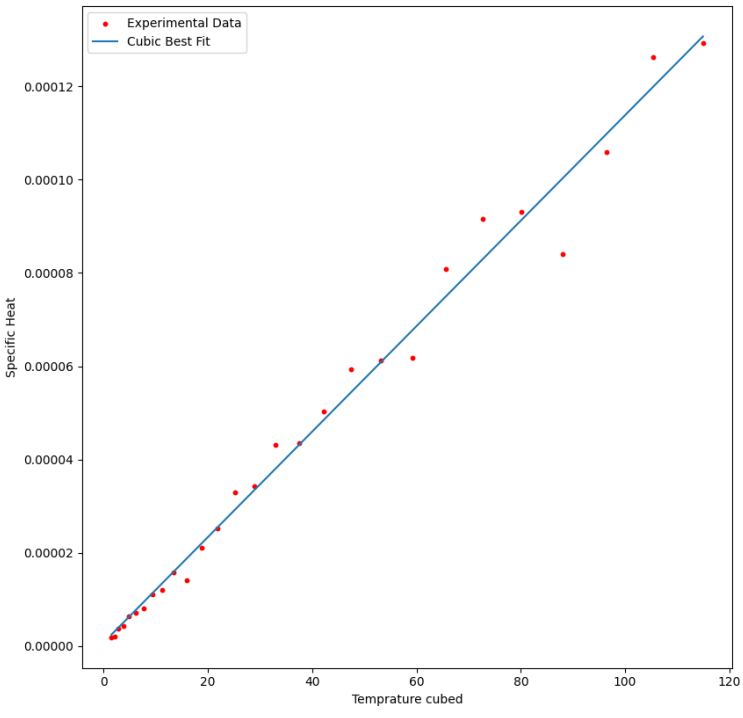
problem5.py problem4.py

problem4.py > ...

```python
import matplotlib.pyplot as plt
import numpy as np
import scipy as sp
import pandas as pd
def linear(x,a,b):
    return a*x + b
data = pd.read_table('DebyeDat.txt', sep=" ")
df = pd.DataFrame(data)
temp = df.iloc[:,0].values
specheat = df.iloc[:,1].values
cubetemp = temp ** 3
parameters = np.polyfit(cubetemp,specheat,1)
td = np.cbrt(322.77/parameters[0])
print("Debye teprature t_d is" , td)
plt.scatter(cubetemp,specheat, s=10,color='r', label = "
plt.plot(cubetemp, linear(cubetemp, parameters[0],parame
plt.xlabel("Temprature cubed")
plt.ylabel("Specific Heat")
plt.legend()
plt.show()
```

PROBLEMS OUTPUT TERMINAL Python

```
plea@ultrasound-124:~/Documents/School Vault/Computing for Physicists/Ho
mework 3$ /bin/python "/home/plea/Documents/School Vault/Computing for P
hysicists/Homework 3/problem4.py"
Debye teprature t_d is 658.5154112596998
```



Problem 5

problem5.py | problem4.py

problem5.py > ...

```python
import matplotlib.pyplot as plt
import numpy as np
import random
points = 10 ** 6
xcoord = np.random.rand(points) * 2 - 1
ycoord = np.random.rand(points) * 2 - 1
circleindex = np.where(np.sqrt(xcoord ** 2 + ycoord ** 2
circlex = xcoord[circleindex]
circley = ycoord[circleindex]
circlecount = len(circleindex[0])
#Ratio of circle to square
pi = circlecount/points * 4
print(pi)
plt.scatter(xcoord, ycoord)
plt.scatter(circlex,circley, color='r')
plt.show()
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

Python
Python

```
/bin/python "/home/plea/Documents/School Vault/Computing for Physicists/Homework 3/problem5.py"
plea@ultrasound-124:~/Documents/School Vault/Computing for Physicists/Homework 3$ /bin/python "/home/plea/Documents/School Vault/Computing for Physicists/Homework 3/problem5.py"
3.140972
```

Figure 1