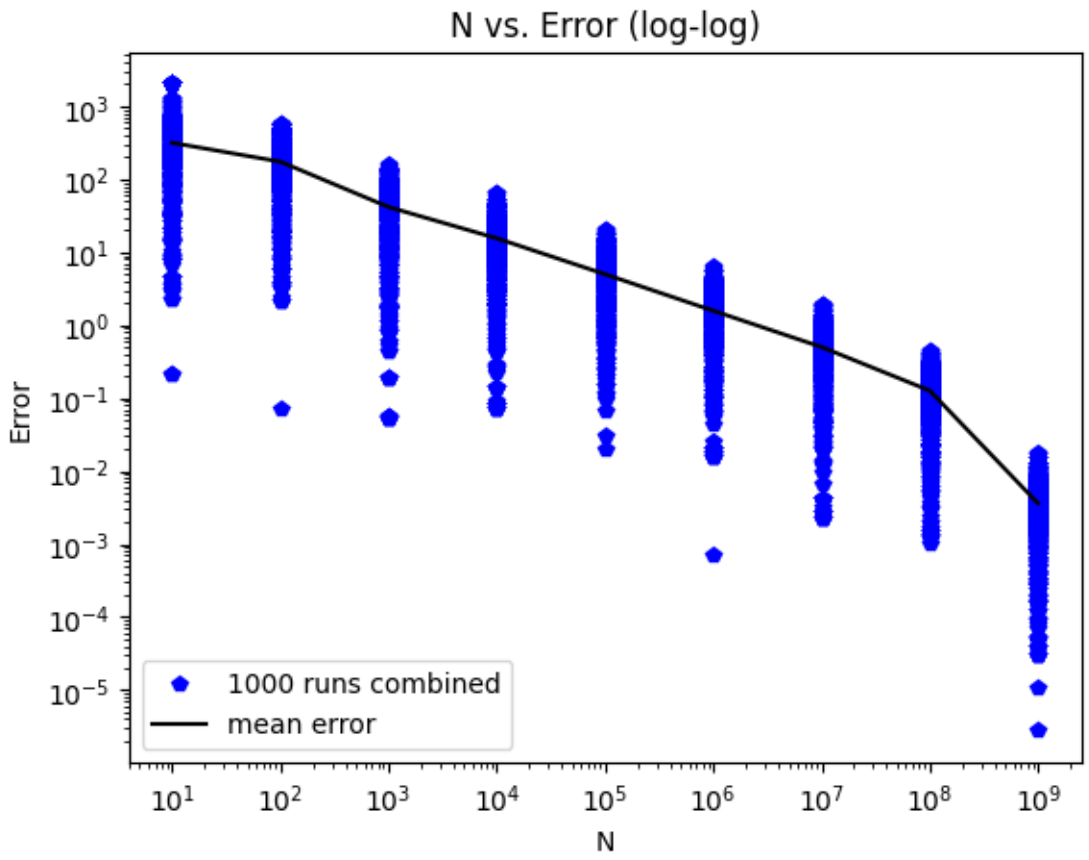
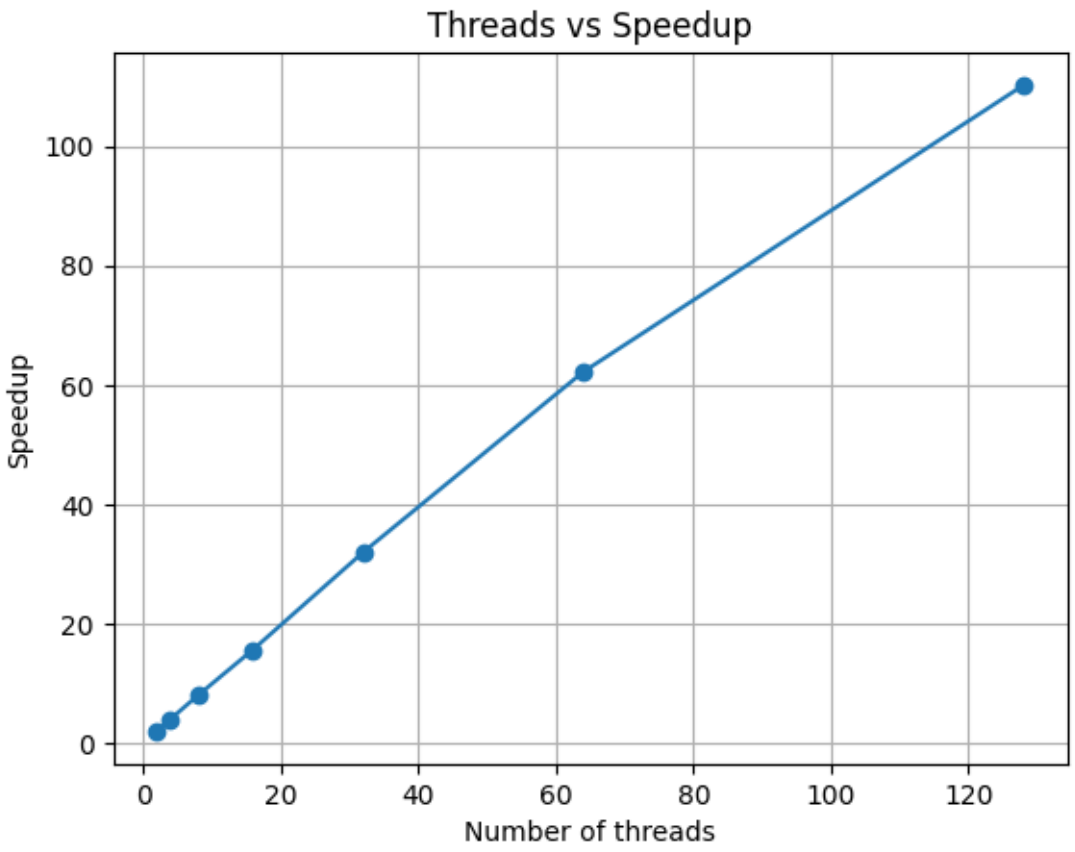
HW3

November 28, 2023

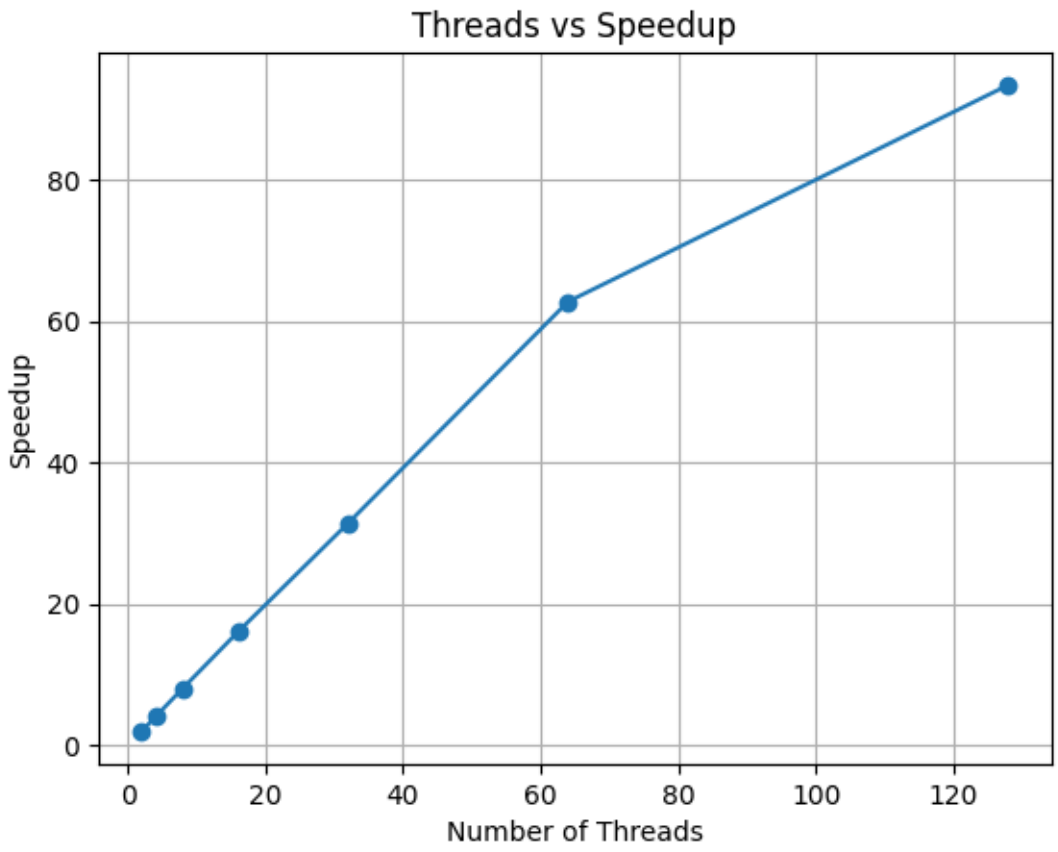
[3]:
```
import numpy as np
import matplotlib.pyplot as plt

data = np.loadtxt("problem_1a.dat")

N_i = data[:, 0]
error = data[:, 1]

unique_N = []
mean_error = []

for N in np.unique(N_i):
    error_N = error[N_i == N]
    mean_error_N = np.mean(error_N) #calculates mean error for each value of 'N'
    unique_N.append(N)
    mean_error.append(mean_error_N)

unique_N = np.array(unique_N)
mean_error = np.array(mean_error)

plt.loglog(data[:, 0], data[:, 1], 'p', label='1000 runs combined',color='blue')
plt.loglog(unique_N, mean_error, label='mean error', color='black')

plt.legend(loc=3)
plt.xlabel("N")
plt.ylabel("Error")
plt.title('N vs. Error (log-log)')

plt.savefig("1a")
```



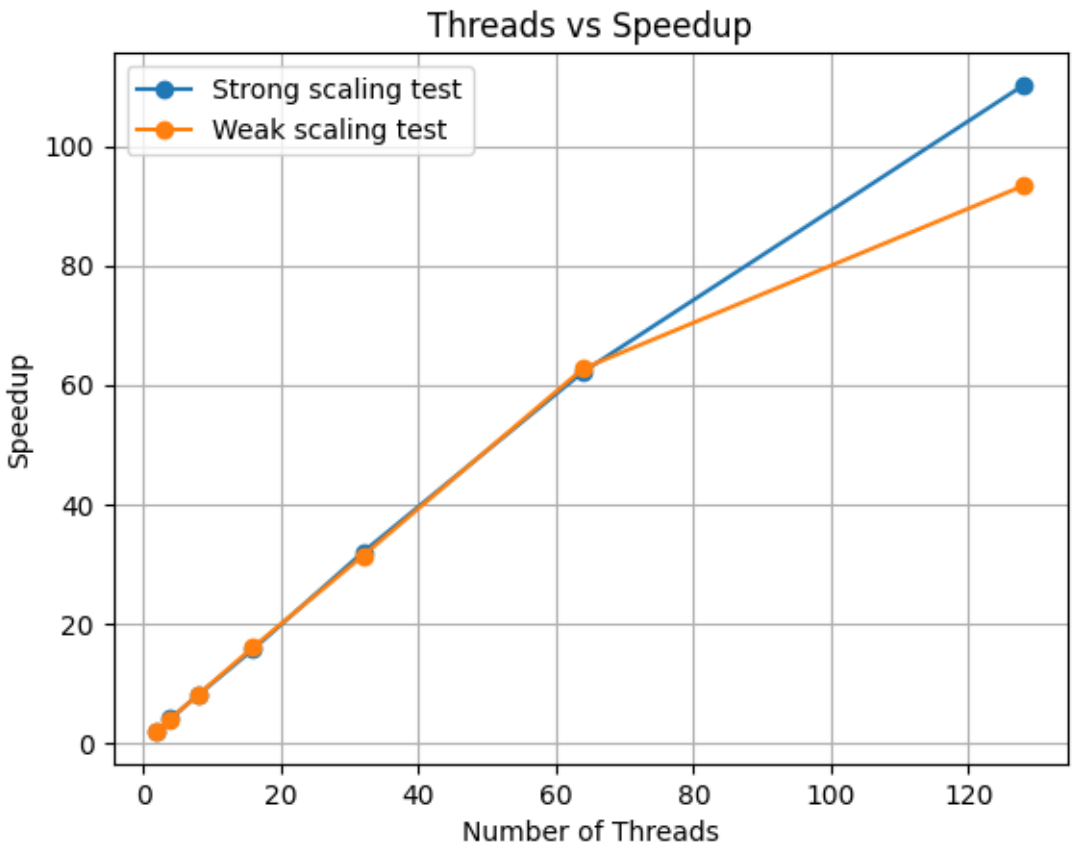
[20]:
```
import numpy as np
from matplotlib import pyplot as plt

data = np.loadtxt("rosenbrock_3b1.dat")

plt.plot(data[1:,0], data[1:,4], marker="o")
plt.xlabel("Number of threads")
plt.ylabel("Speedup")
plt.grid(True, which='both', axis='both')
plt.title('Threads vs Speedup')
plt.savefig("3b1")
```



[23]:
```
import numpy as np
from matplotlib import pyplot as plt

data = np.loadtxt("rosenbrock_3b2.dat")

plt.plot(data[1:,0], data[1:,4], marker="o")
plt.xlabel("Number of Threads")
plt.ylabel("Speedup")
plt.grid(True, which='both', axis='both')
plt.title("Threads vs Speedup")
plt.savefig("3b2")
```



[29]:
```
import numpy as np
from matplotlib import pyplot as plt

data1 = np.loadtxt("rosenbrock_3b1.dat")
data2 = np.loadtxt("rosenbrock_3b2.dat")

plt.plot(data1[1:,0], data1[1:,4], label='Strong scaling test', marker='o')
plt.plot(data2[1:,0], data2[1:,4], label='Weak scaling test',marker='o')
plt.xlabel("Number of Threads")
plt.ylabel("Speedup")
plt.legend(loc=2)
plt.grid(True, which='both', axis='both')
plt.title("Threads vs Speedup")
plt.savefig("3b")
```


Threads vs Speedup
Strong scaling test
Weak scaling test
Speedup
Number of Threads
0
20
40
60
80
100
120

[ ]: