

H4

January 31, 2018

```
In [26]: import numpy as np
```

1 Homework Problem 4

```
In [27]: data_a = np.loadtxt("data_H4_a.csv")
```

1.1 Solution of a)

Reads in the numbers and computes their average

```
In [29]: average = np.mean(data_a)
         print("The Average is:", average)
```

The Average is: 0.500459768

1.2 Solution of b)

Estimate the error of the average using the jackknife method.

```
In [4]: N = len(data_a)
```

```
In [5]: xixi = 0.0
         xi = 0.0
```

```
         for i in range(N):
             xi = xi + data_a[i]
             for j in range(N):
                 xixi = data_a[i]*data_a[i] + xixi
```

```
         print("estimate the error of the average using the jackknife method is:", (xixi-xi**2)/N*
```

```
         del data_a
```

estimate the error of the average using the jackknife method is: 0.0789934163943

1.3 Solution c)

Plot the wall clock time

```
In [15]: %%timeit
```

```
#!/usr/bin/env python

# Define a filename.
filename = "data_H4_8.txt"

# Open the file as f.
# The function readlines() reads the file.
with open(filename) as f:
    content = f.readlines()

array = []
for line in content:
    array.append(float(line))
array_np = np.array(array)
del array

average = np.mean(array_np)
print("Average is:", average)

error = np.mean((array_np-average)**2)
print("error of the average", error)

del array_np
```

```
Average is: 0.499975734488
error of the average 0.0833341997316
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52.8 s ± 2.04 s per loop (mean ± std. dev. of 7 runs, 1 loop each)
```

time = [4.76, 9.71, 14, 18.8, 25, 36, 46, 53] #s

p = [1, 2, 3, 4, 5, 6, 7, 8]

1.4 Solution d)

The first 4 points is almost linear, but not for the last three points, which means that the finite computer memory limits the calculation speed of computer.