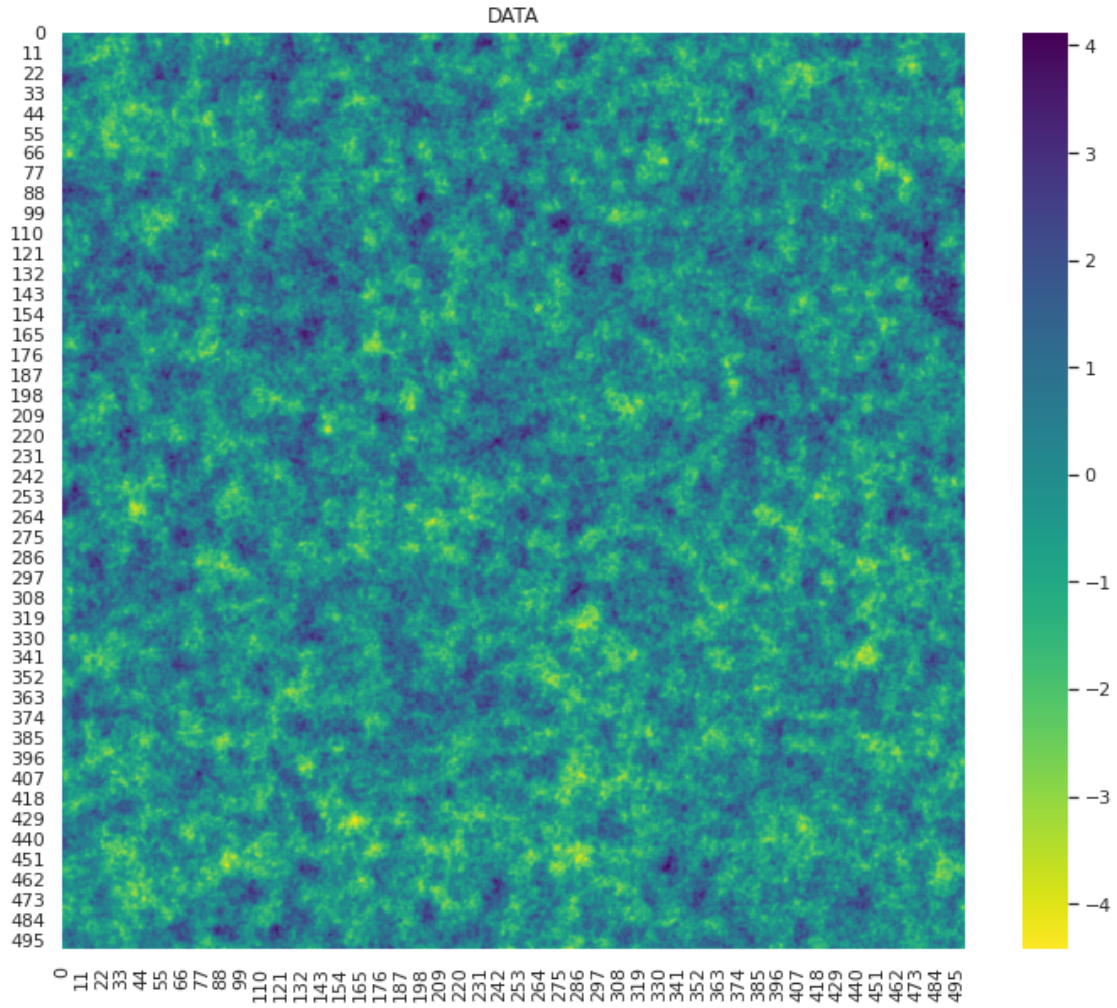
midterm1

March 9, 2023

[ ]:
```
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
sns.set()
```

[ ]:
```
data = np.loadtxt("data_midterm1.txt")
```

[ ]:
```
plt.figure(figsize=(12,10))
sns.heatmap(data, cmap="viridis_r")
plt.title("DATA")
plt.savefig("Data")
```



[ ]:
```
def Mean(d):
    """calculate the mean of data

    Args:
        d (2d_array): array of data

    Returns:
        float: mean of data
    """
    n,m = d.shape
    x = np.sum(d, axis=1)/m
    mean = np.sum(x)/n
    return mean
```

[ ]:
```
#mean of data using native python
Mean(data)
```

[ ]:
```
-4.405364961712621e-16
```

[ ]:
```
#mean of data using numpy library
data.mean()
```

[ ]:
```
-4.0017766878008844e-16
```

[ ]:
```
def std(d):
    """calculate standard deviation

    Args:
        d (2d_array): array of data

    Returns:
        float: standard deviation
    """
    n,m = d.shape
    x = np.sum(d, axis=1)/m
    mean = np.sum(x)/n
    x2 = np.sum(d**2, axis=1)/m
    mena2 = np.sum(x2)/n
    var = mena2 - mean
    std = np.sqrt(var)
    return std
```

[ ]:
```
#standard deviation using native python
std(data)
```

[ ]:
```
0.999999999999995
```

[ ]:
```
#standard deviation using numpy library
data.std()
```

[ ]:
```
0.9999999999999948
```

[ ]:
```
#calculate MEAN standard deviation
n, m = data.shape
std(data)/np.sqrt(n*m)
```

[ ]:
```
0.00199999999999999
```