

convergences

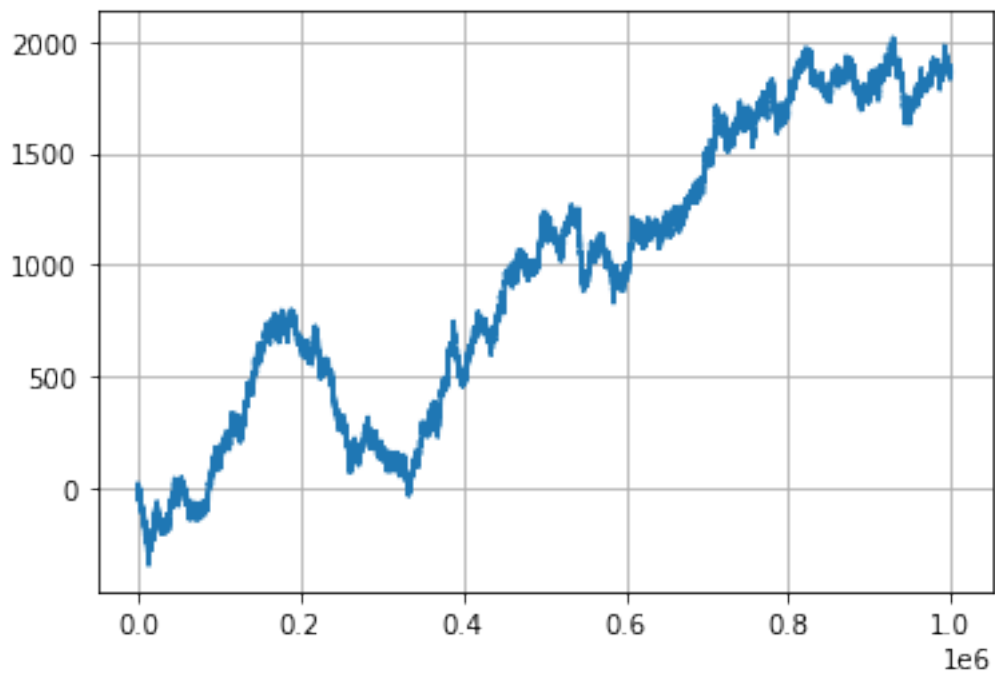
January 19, 2023

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

      np.random.seed(0)
```

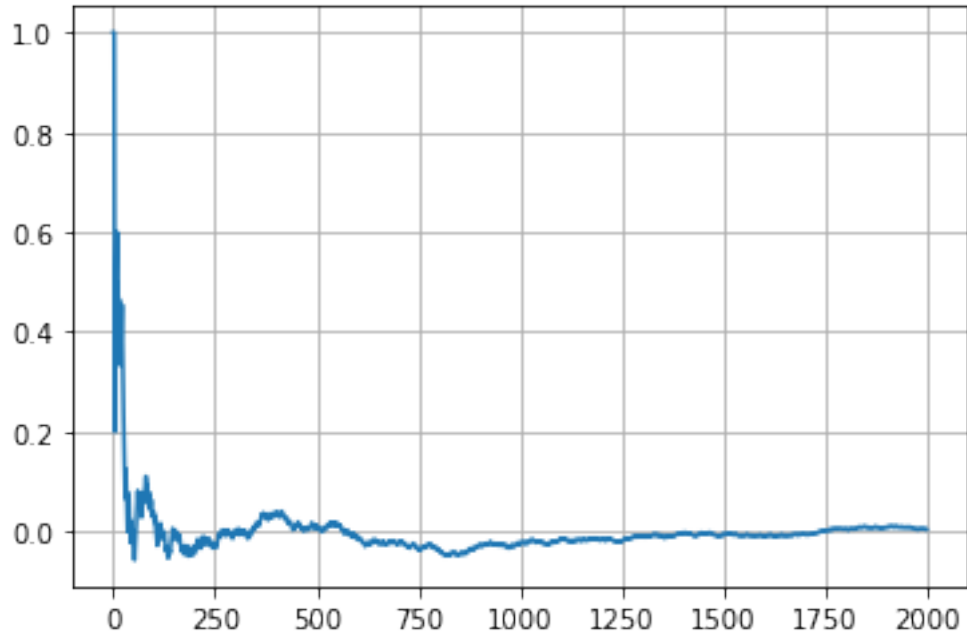
```
[2]: x = np.sign(np.random.normal(size=1000000))
      n = np.arange(1,1000001)
      sx = np.cumsum(x)
```

```
[3]: plt.plot(sx)
      plt.grid()
      plt.show()
```

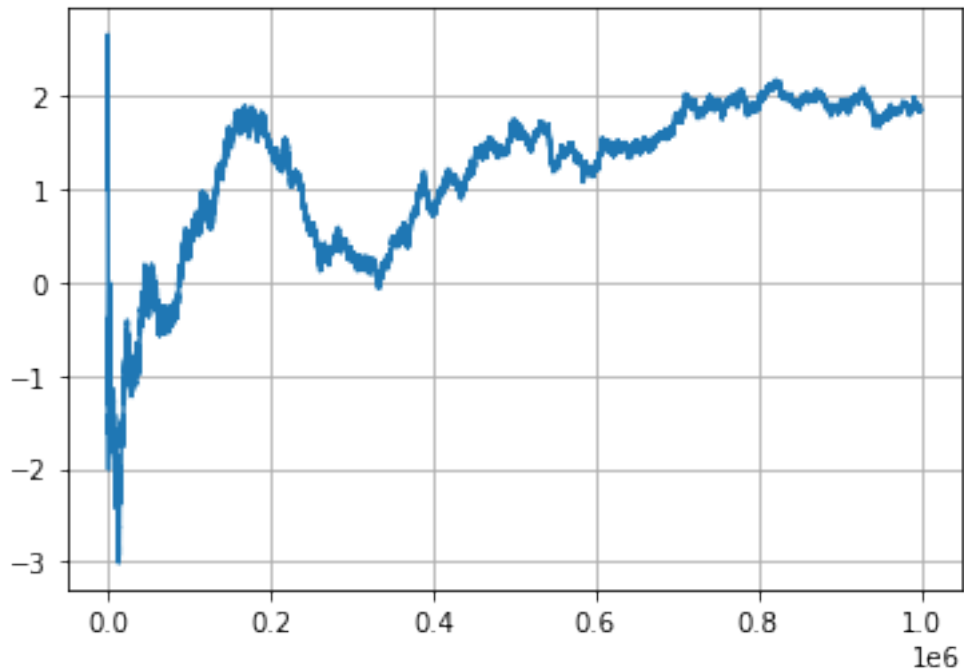


```
[4]: xm = np.sign(np.random.normal(size=2000))
      nm = np.arange(1,2001)
```

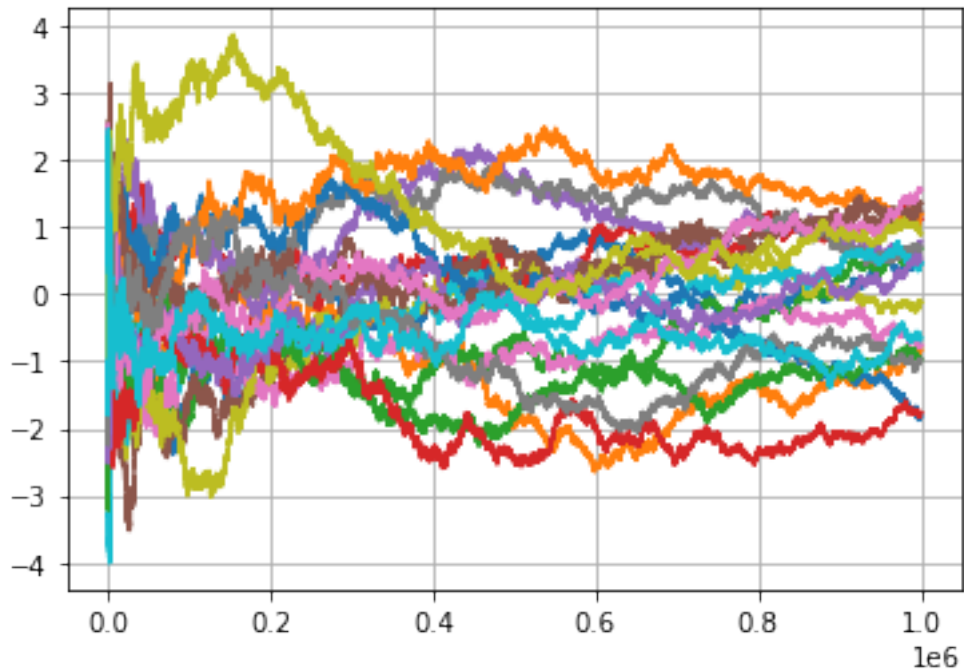
```
sxm = np.cumsum(xm)/nm
plt.plot(sxm)
plt.grid()
plt.show()
```



```
[5]: sx = np.cumsum(x)/np.sqrt(n)
plt.plot(sx)
plt.grid()
plt.show()
```

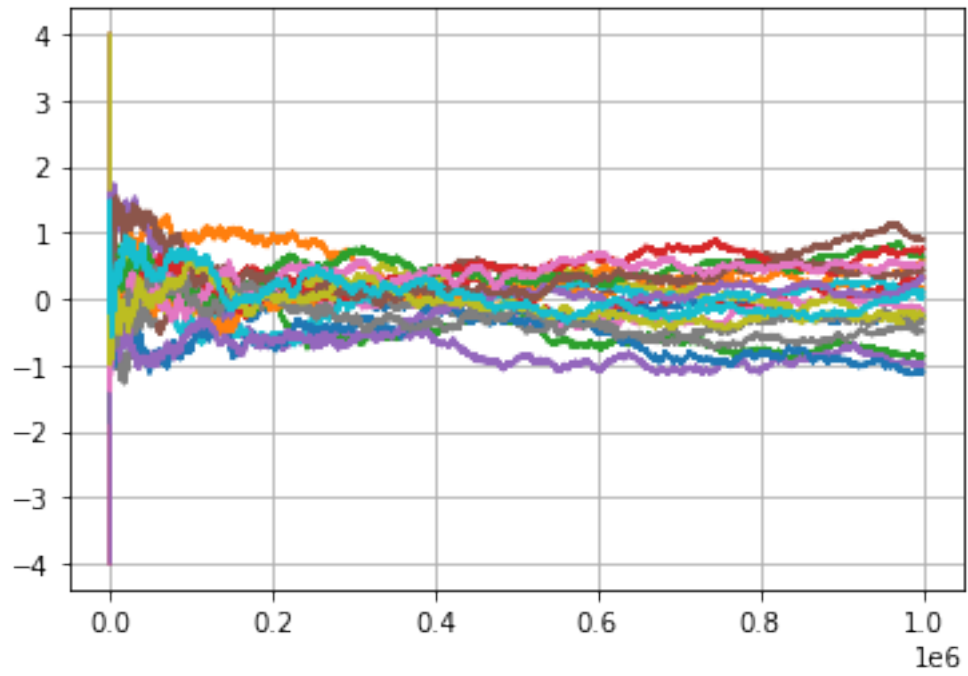


```
[6]: for i in range(20):  
      x = np.sign(np.random.normal(size=1000000))  
      n = np.arange(1,1000001)  
      sx = np.cumsum(x)/np.sqrt(n)  
      plt.plot(sx)  
plt.grid()  
plt.show()
```



```
[12]: import warnings
warnings.filterwarnings("ignore")
```

```
[14]: for i in range(20):
    x = np.sign(np.random.normal(size=1000000))
    sx = np.cumsum(x)/np.sqrt(n)/np.sqrt(2*np.log(np.log(n)))
    plt.plot(sx)
plt.grid()
plt.show()
```



[]: