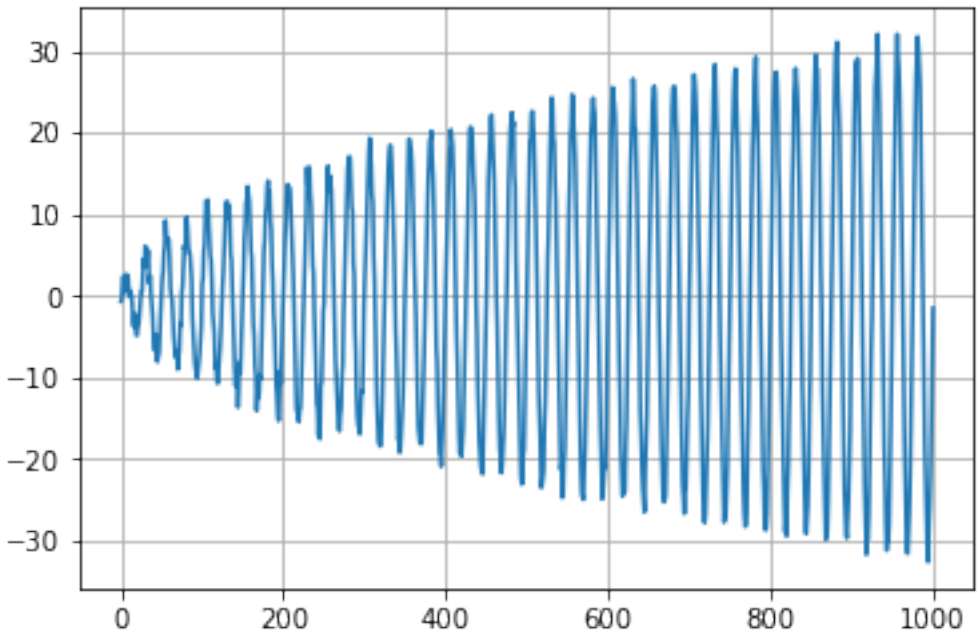
Untitled

August 8, 2017

In [242]:
```
import math
import numpy as np
import matplotlib.pyplot as plt
```

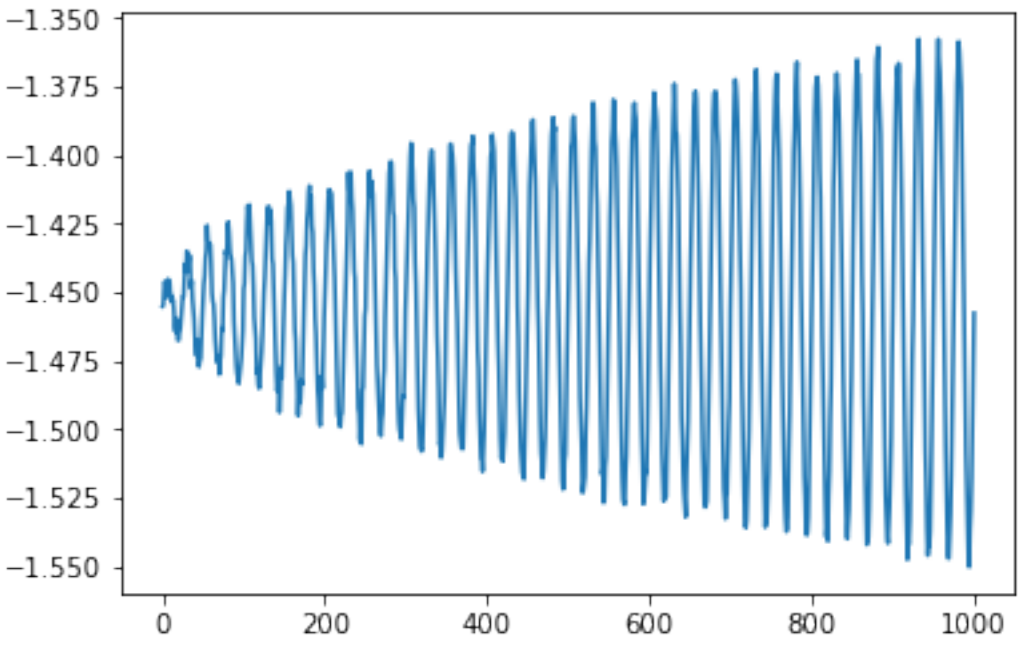
In [243]:
```
ll = 1000
T = 25
rand = np.random.normal(0, 1, (ll,))
#X = [i / 25 * math.sin(i * 2 * math.pi / 25) + rand[i] for i in range(40
t = np.linspace(0, ll, ll)
X = t**0.5 * np.sin(t * 2 * np.pi / T) + rand
```

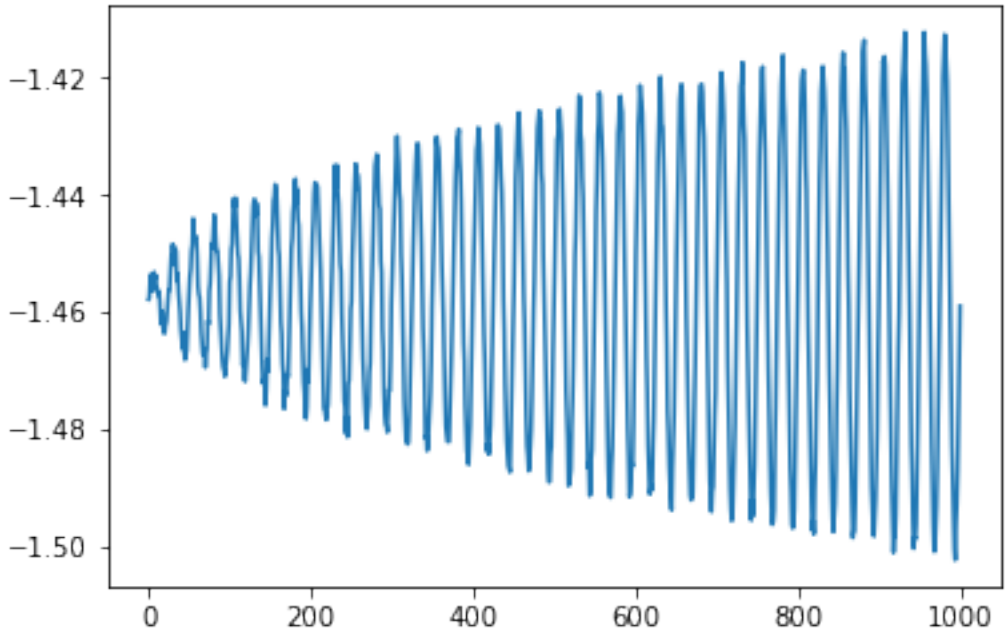
In [244]:
```
plt.plot(t, X)
plt.grid()
plt.show()
```



In [250]:
```
Q = np.ones((ll,))
sigma = np.var(X) * np.ones(ll)
Q = np.ones((ll, 1))
S = np.zeros((ll, 1))
phi = 2 * np.pi * (t % T)
psi = 2 * np.pi * (t % T)
alpha = 0.5
gamma = 5
```

In [269]:
```
from copy import deepcopy
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error as mse

for i in range(10):
    for j in range(len(t)):
        w = np.abs(1 - alpha) ** (-np.abs(t[j] - t) / T)
        K = (- (psi[j] - phi) ** 2 / gamma)
        S[j] = np.sum(w * X / Q * K) / np.sum(w * K)

    lm = LinearRegression()
    lambdas = 1 / sigma
    lm.fit(X=S.reshape(-1, 1), y=X.reshape(-1, 1), sample_weight=lambdas)
    Q = lm.predict(X.reshape(-1, 1))
    X_hat = Q.reshape(-1, 1) * S.reshape(-1, 1)
    #print(mse(X, X_hat))

    plt.plot(t, Q)
    plt.show()

    for j in range(len(t)):
        K = (-(psi[j] - phi) ** 2 / gamma)
        sigma[j] = np.sum((X - X_hat)**2 * K) / np.sum(K)
```


−1.350
−1.375
−1.400
−1.425
−1.450
−1.475
−1.500
−1.525
−1.550
0
200
400
600
800
1000


−1.42
−1.44
−1.46
−1.48
−1.50
0
200
400
600
800
1000

```
KeyboardInterrupt                         Traceback (most recent call last)

<ipython-input-269-ecca6e437734> in <module>()
      7         w = np.abs(1 - alpha) ** (-np.abs(t[j] - t) / T)
      8         K = (- (psi[j] - phi) ** 2 / gamma)
----> 9         S[j] = np.sum(w * X / Q * K) / np.sum(w * K)
     10
     11     lm = LinearRegression()


KeyboardInterrupt:
```

```
In [263]: X_hat = np.zeros(X.shape)
          X_hat.shape

Out[263]: (1000,)

In [173]: (S.reshape(-1, 1) * Q).shape

Out[173]: (500, 1)

In [ ]:
```