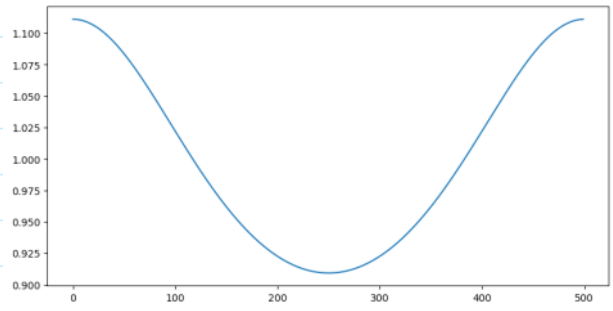
Lab 6

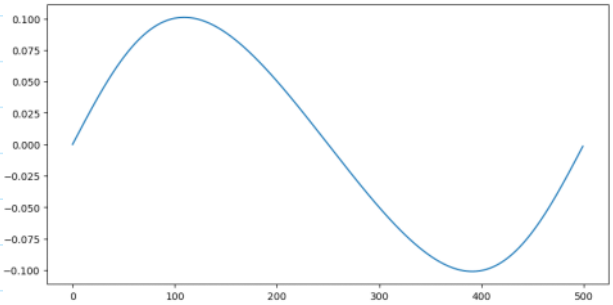
16 January 2023 21:09

Name: TRAN, Thanh Cong
Student ID: 2210421

Magnitude of G



Phase of G



6.1)

$$g(k) = (0.1)^k u(k)$$

$$G(e^{jw}) = \sum_{k=-\infty}^{+\infty} g(k) e^{-jwk}$$

$$= \sum_{k=-\infty}^{+\infty} (0.1)^k u(k) e^{-jwk}$$

$$= \sum_{k=0}^{+\infty} (0.1)^k e^{-jwk}$$

$$= \sum_{k=0}^{+\infty} (0.1 e^{-jw})^k$$

$$= \frac{1}{1 - 0.1 e^{-jw}}$$

6.2)

$$y(k) = 0.1\, y(k-1) + x(k)$$

a)

$$Y(e^{jw}) - 0.1 e^{-jw} Y(e^{jw}) = X(e^{jw})$$

$$G(e^{jw}) = \frac{Y(e^{jw})}{X(e^{jw})} = \frac{1}{1 - 0.1 e^{-jw}}$$

b) $x(k) = \cos(0.05\pi k) u(k)$

* $G(e^{jw})|_{w=0.05\pi} = \frac{1}{1 - 0.1 e^{-j0.05\pi}} = \frac{1}{1 - 0.1(\cos(-0.05\pi) + j \sin(-0.05\pi))}$

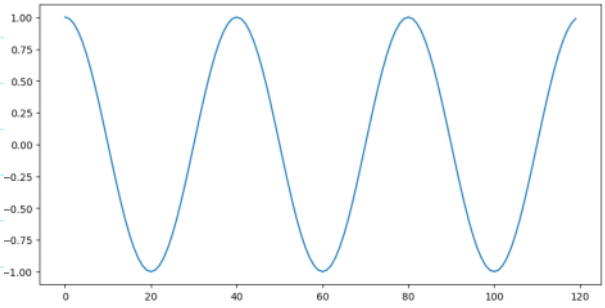
$$= \frac{1}{0.901 + 0.0156j}$$

$$= \frac{1}{0.901 e^{j0.0173}}$$

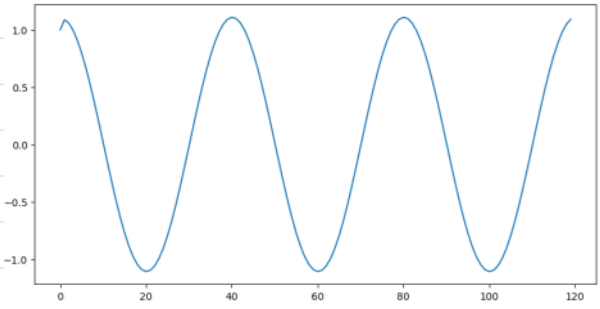
$$= 1.109 e^{-j0.0173}$$

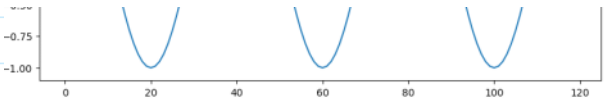
* $y_{ss}(k) = 1.109 \cos(0.05\pi k - 0.0173)$

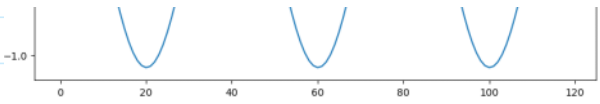
x(k)



Response y_ss(k)




−0.75
−1.00
0
20
40
60
80
100
120


−1.0
0
20
40
60
80
100
120