INTRODUCTION TO CONTROL SYSTEMS

PREPARED BY
Tyler Long

In partial fulfillment of the requirements for
ECET 4610

PREPARED BY: _____

APPROVED BY: _____

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SOUTHERN POLYTECHNIC STATE UNIVERSITY

Quizzes:

Question 1

$Formula: x = x_0 + v_0 t + 0.5at^2$

$Variables: t = 5\sec \quad x_0 = 12m \quad v_0 = 16m/s \quad a = -9.81m/\sec^2$

Matlab Work:

```
t=5

t =

     5

x0=12

x0 =

    12

v0=16

v0 =

    16

a=-9.81

a =

   -9.8100

 openvar('x0', x0);
 openvar('x0', x0);
 openvar('x0', x0);
x=x0+v0*t+.5*a*t^2

x =

  -30.6250
```

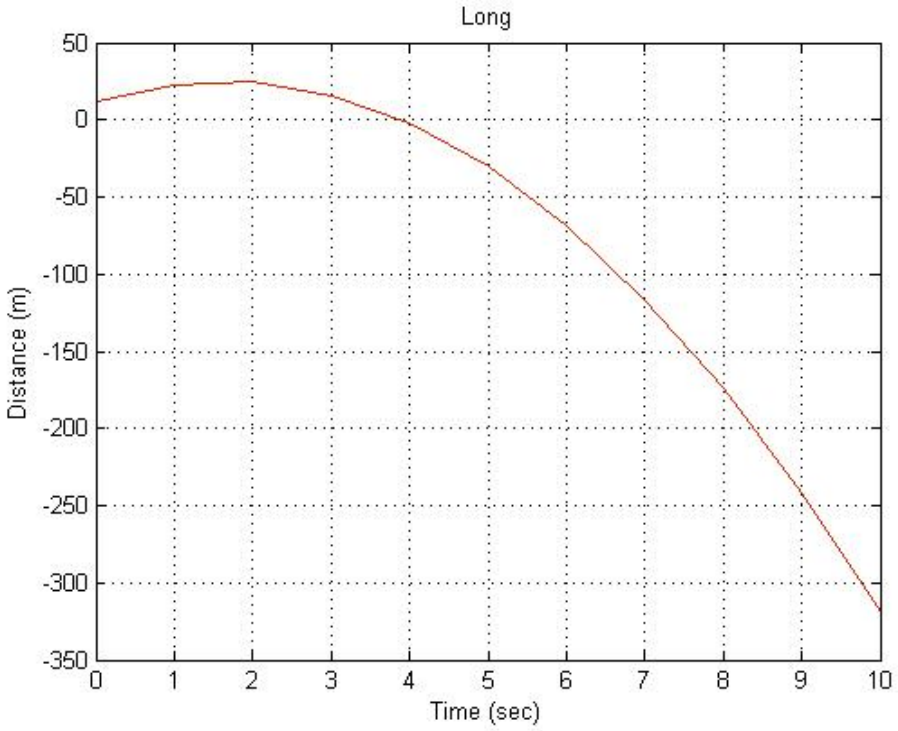
Question 2

$Formula: x = x_0 + v_0 t + 0.5at^2$

$Variables: x_0 = 12m \quad v_0 = 16m/s \quad a = -9.81m/\sec^2$

Matlab Work:

```
t=0:1:10

t =

    0    1    2    3    4    5    6    7    8    9   10

x=x0+v0*t+.5*a*t.^2

x =

  Columns 1 through 8

   12.0000   23.0950   24.3800   15.8550   -2.4800  -30.6250  -68.5800 -116.3450

  Columns 9 through 11

 -173.9200 -241.3050 -318.5000

plot(t,x)
```

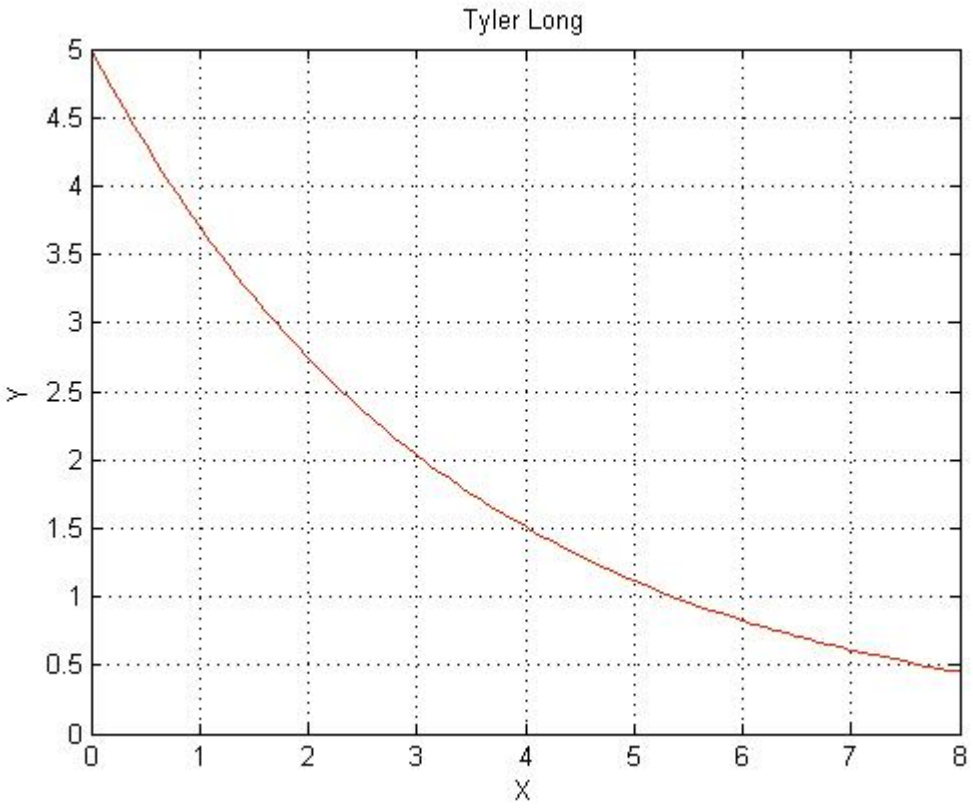


Question 3

$Formula: \ y = 5e^{-0.3x}$

Matlab Work:

```
x=0:.1:8

y=5*exp(-.3*x)

plot(x,y)
```



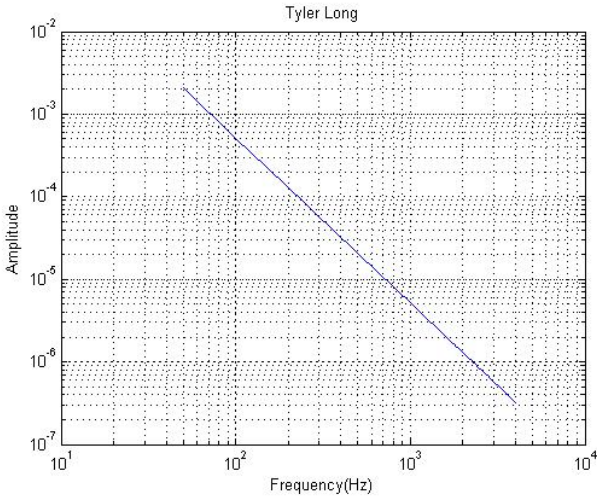
Question 4

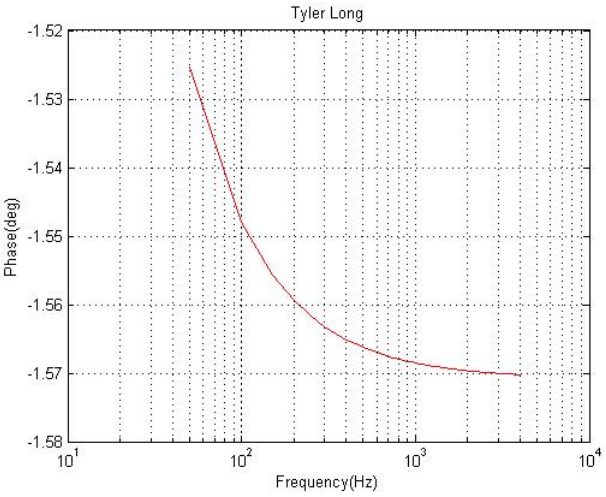
$$Formula: A_v = \frac{V_O}{V_I} = \frac{1}{(1 + j2\pi fRC)}$$

$$Variables: R = 20k\Omega \quad C = 3.5\mu F$$

Matlab Work:

```
R =

     20000

C=3.5*10^-6

C =

  3.5000e-006

f=0:50:4000
Av=1./(1+j*2*pi*f*R*C)
plot(f,Av)
phase=angle(Av)
plot(f,phase)
```





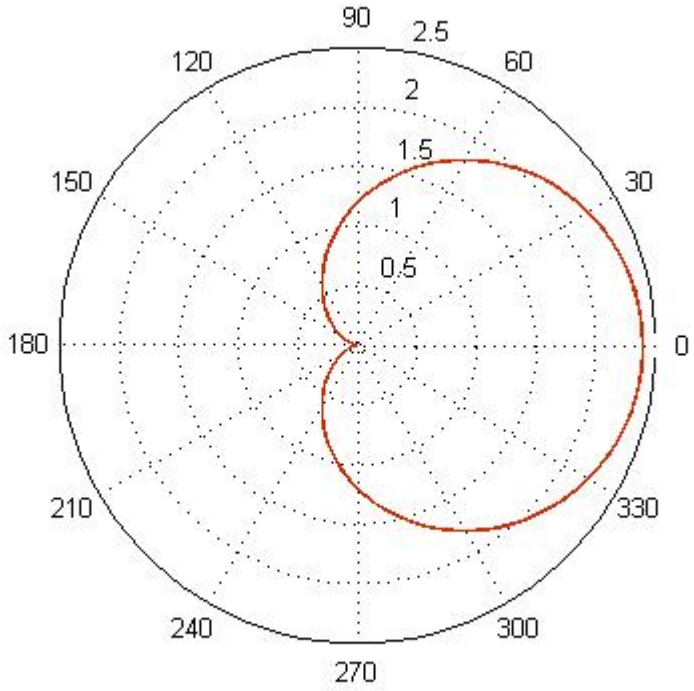
Question 5

$Formula: G = 2g(1+\cos\theta)$

$Variables: g = 0.6$

Matlab Work:

```
angle=0:.1:90
GAIN=2*g.*(1+cos(angle))
```



Question 6

$$Formula: r = \frac{p}{(1 - \varepsilon \cos\theta)}$$

$$Variables: \ p = 1000km$$

Matlab Work:

```
angle=0:.1:360
p=1000

p =

        1000

ea=0

ea =

     0

eb=.25

eb =

    0.2500

ec=.39

ec =

    0.3900

ed=.78

ed =

    0.7800

r1=p./(1-ed*cos(angle))
polar(angle,r1)
hold
Current plot held
r1=p./(1-ec*cos(angle))
polar(angle,r1)
r1=p./(1-eb*cos(angle))
polar(angle,r1)
r1=p./(1-ea*cos(angle))
polar(angle,r1)
```