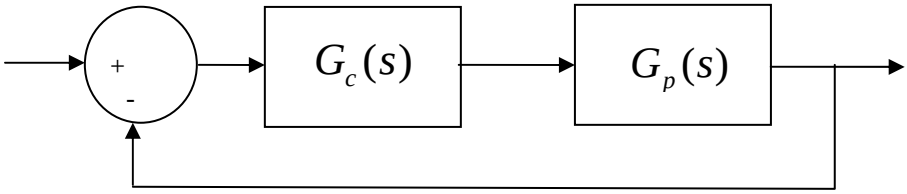
Name _____ Mailbox _____

Quiz #7

1) Consider the following control system with plant $G_p(s) = \frac{1}{s+1}$ and PI controller $G_c(s) = \frac{k(s+z)}{s}$



Using the Routh array, we can conclude which of the following:

a) $k > 0$ b) $kz > 0$ c) $k > 0$ and $kz > 0$ d) $k > -1$ and $kz > 0$ e) none of these

2) Assuming we have a characteristic equation that leads to the following Routh array:

s^4	1	2	1
s^3	1	2	
s^2	0	1	
s^1			
s^0			

Is this system stable? a) yes b) no c) I don't really care

Name _____ Mailbox _____

3) For the 2x2 matrix $P = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, the inverse of this matrix, P^{-1}, is which of the following:

a) $P^{-1} = \frac{1}{ad-bc}\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ b) $P^{-1} = \frac{1}{ad-bc}\begin{bmatrix} d & b \\ c & a \end{bmatrix}$ c) $P^{-1} = \frac{1}{ad+bc}\begin{bmatrix} d & b \\ c & a \end{bmatrix}$

d) $P^{-1} = \frac{1}{ad+bc}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ e) $P^{-1} = \frac{1}{ad-bc}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ f) none of these

4) For the following state variable model

$$\dot{q}(t) = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} q(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$
$$y(t) = [1 \quad 2] q(t)$$

The poles of the system are at

a) -1 and -3 b) -2 and -2 c) 1 and 3 d) 0 and 1 e) 2 and 2

5) For the following state variable model

$$\dot{q}(t) = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} q(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$
$$y(t) = [1 \quad 2] q(t)$$

The poles of the system are at

a) -1 and -2 b) -1 and -1 c) 1 and 3 d) 0 and 1 e) 1 and 2