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ECE-205 Quiz #8

Problems 1-2 assume we have a system modeled with the transfer function

$$H(s) = \frac{(s+1)(s+2)}{s^2(s+4)}$$

1) This system model has how many **zeros**? a) 0 b) 1 c) 2 d) 3

2) This system model has how many **poles** (count all poles, not just distinct poles)?

a) 0 b) 1 c) 2 d) 3

3) How many terms will there be in the partial fraction expansion of $H(s) = \frac{s+1}{s^2(s+2)}$?

a) 0 b) 1 c) 2 d) 3

4) How many terms will there be in the partial fraction expansion of $H(s) = \frac{s}{(s+1)(s+2)}$?

a) 0 b) 1 c) 2 d) 3

5) An impulse response $h(t)$ is composed of the terms $1,\ t,\ e^{-t}$ A possible corresponding transfer function (for some constant value *A*) is

a) $H(s) = \frac{A}{s(s+1)}$ b) $H(s) = \frac{A}{s^2(s+1)}$

c) $H(s) = \frac{As}{(s+1)}$ d) $H(s) = \frac{A}{s(s+1)^2}$

6) In using partial fractions to go from the Laplace domain to the time domain for a transfer function with no pole/zero cancellations, the number of terms used in the partial fraction expansion is determined by

a) the zeros of the transfer function b) the poles of the transfer function

For problems 7-8 assume we have a system modeled by the transfer function $H(s)$.

7) To determine the **impulse response** we should compute the inverse Laplace transform of

a) $Y(s) = H(s)$ b) $Y(s) = H(s)\frac{1}{s}$ c) $Y(s) = H(s)\frac{1}{s^2}$ d) $Y(s) = H(s)\frac{1}{s^3}$

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8) To determine the **<u>(unit) step response</u>** we should compute the inverse Laplace transform of

a) $Y(s) = H(s)$ b) $Y(s) = H(s)\dfrac{1}{s}$ c) $Y(s) = H(s)\dfrac{1}{s^2}$ d) $Y(s) = H(s)\dfrac{1}{s^3}$

9) For the transfer function

$$H(s) = \frac{1}{s(s+2)^2}$$

the corresponding impulse response $h(t)$ is composed of which terms?

a) $t^2 e^{-2t}$ b) t and te^{-2t} c) 1 and te^{-2t}

d) te^{-2t} e) 1, e^{-2t}, and te^{-2t}

10) The Laplace transform of $x(t) = u(t) - u(t-2)$ is

a) $X(s) = 1 - e^{-2s}$ b) $X(s) = 1 - e^{+2s}$ c) $X(s) = \dfrac{1}{s} - \dfrac{e^{-2s}}{s}$ d) none of these

11) The Laplace transform of $x(t) = te^{-3t}u(t)$ is

a) $X(s) = \dfrac{1}{s}\dfrac{1}{s+3}$ b) $X(s) = \dfrac{1}{s+3}$ c) $X(s) = \dfrac{1}{(s+3)^2}$ d) $X(s) = \dfrac{2}{(s+3)^2}$

12) The Laplace transform of $x(t) = (t-2)u(t-2)$ is

a) $X(s) = \dfrac{1}{s-2}$ b) $X(s) = \dfrac{e^{-2s}}{s}$ c) $X(s) = \dfrac{e^{-2s}}{s-2}$ d) none of these

13) The Laplace transform equivalent impedance of an inductor (assuming the initial conditions are equal to zero) is

a) $Z(s) = \dfrac{1}{Ls}$ b) $Z(s) = \dfrac{L}{s}$ c) $Z(s) = Ls$ d) $Z(s) = \dfrac{s}{L}$

14) The Laplace transform equivalent impedance of a capacitor (assuming the initial conditions are equal to zero) is

a) $Z(s) = Cs$ b) $Z(s) = \dfrac{C}{s}$ c) $Z(s) = \dfrac{s}{C}$ d) $Z(s) = \dfrac{1}{sC}$

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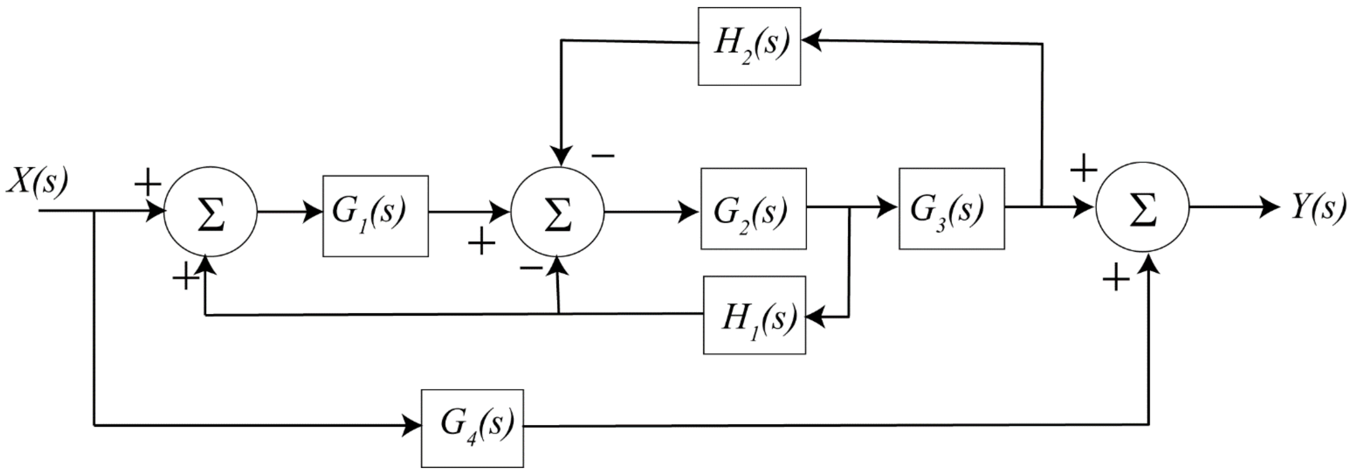
Problems 15 – 17 refer to the signal flow graph representation of the following block diagram.



15) How many **paths** are there? a) 0 b) 1 c) 2 d) 3 e) 4

16) How man **loops** are there? a) 0 b) 1 c) 2 d) 3 e) 4

17) Are any of the **cofactors** equal to 1? a) yes b) no

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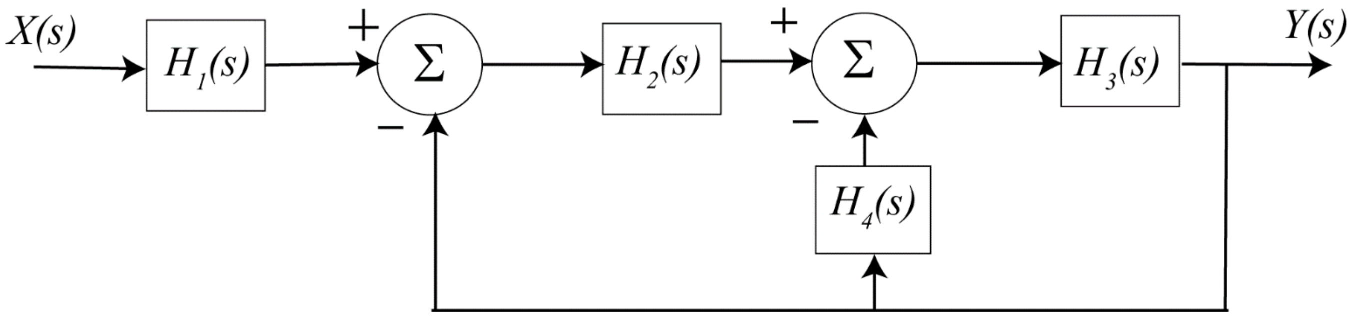
For problems 18 – 21 consider the signal flow graph representation of the following block diagram.



18) How many **paths** are there? a) 0 b) 1 c) 2 d) 3 e) 4

19) How many **loops** are there? a) 0 b) 1 c) 2 d) 3 e) 4

20) The **determinant** (Δ) is a) 1 b) $1-H_2H_3-H_3H_4$ c) $1+H_2H_3+H_3H_4$ d) none of these

21) The **transfer function** is a) 1 b) $\dfrac{H_1H_2H_3}{1-H_2H_3-H_3H_4}$ c) $\dfrac{H_1H_2H_3}{1+H_2H_3+H_3H_4}$