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Quiz #1

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 the total number) 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) The **bandwidth** (3 dB point) of the system with transfer function $H(s)=\frac{10}{s+10}$ is

a) 10 Hz b) 1 Hz c) 10 radians/sec d) 1 radians/sec

6) The **bandwidth** (smallest 3 dB point) of the system with transfer function $H(s)=\frac{40}{(s+2)(s+20)}$ is

a) 2 Hz b) 20 Hz c) 2 radians/sec d) 20 radians/sec

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

8) 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

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For problems 9-11 assume we have a system modeled by the transfer function $H(s)$.

9) To determine the **<u>impulse response</u>** 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) $Y(s) = H(s)\frac{1}{s^3}$

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

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

11) To determine the **<u>(unit) ramp response</u>** 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) $Y(s) = H(s)\frac{1}{s^3}$

12) 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}

Problems 13 and 14 refer to the following transfer function

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

13) For this transfer function, the corresponding impulse response $h(t)$ is composed of which terms?

a) $e^{-t}\cos(2t), e^{-t}\sin(2t)$ b) $e^{-2t}\cos(t), e^{-2t}\sin(t)$
c) $e^{-t}\cos(4t), e^{-t}\sin(4t)$ d) $e^{-4t}\cos(t), e^{-4t}\sin(t)$

14) The **poles** of the transfer function are

a) 2 $\pm$ j b) -2 $\pm$ j
c) -1 $\pm$ 2j d) -1 $\pm$ 4j