

**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**? 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 **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)  $Y(s) = H(s)\frac{1}{s^3}$

10) To determine the **(unit) step 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)  $Y(s) = H(s)\frac{1}{s^3}$

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

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)  $-1 \pm 4j$