Unit 16 - Week 10 :Nonminimum phase system

Week 10 -Assessment

The due date for submitting this assignment has passed. Due on 2018-10-10, 23:59 IST.
As per our records you have not submitted this assignment.

1) The transfer function of a non-minimum phase system is given as $P_{NMP}(s) = \frac{1-s}{s^2+s+1}$. Identify the correct plot for the unit step response [x(t)] of the system. *1 point*

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No, the answer is incorrect.
Score: 0

Accepted Answers:

2) Pade's approximation for time delay e^{-sT} is better than its Taylor's series approximation because: *1 point*

- Pade's approximants, unlike Taylor's series approximants, yield rational functions with unity gain at all frequencies.
- Pade's approximants are easy to calculate when compared to Taylor's series approximants.
- Pade's approximants are non-causal functions while Taylor's series approximants are causal functions.
- Pade's approximants provide exactly equal phase as that provided by the time delay e^{-sT}.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Pade's approximants, unlike Taylor's series approximants, yield rational functions with unity gain at all frequencies.

3) Identify the bode plot of the Blaschke product $B(s) = (\frac{a-s}{a+s})$ from the options given below: *1 point*

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No, the answer is incorrect.
Score: 0

Accepted Answers:

4) The transfer function of a minimum phase system is given as $L_{MP}(s) = \frac{1}{s^2+s+1}$. A right half-plane zero at s = 1 is added to the given system. The transfer function of the resulting non-minimum phase system is given as $L_{NMP}(s) = \frac{1-s}{s^2+s+1}$. Find out the change in the phase margin due to the addition of the right half-plane zero. ***1 point***

- Decreases by 10°.
- Decreases by 90°
- Increases by 15°
- Decreases by 15°

No, the answer is incorrect.
Score: 0

Accepted Answers:
Decreases by 90°

5) A certain loop gain L(s) has a RHP zero at s=43 rad/s, all other poles and zeros of the loop gain are on the left half of the s-plane. It is desired that the loop gain has a phase margin of 40°. Calculate the approximate value of the gain cross-over frequency (ω_{gc}) if the roll-off rate near ω_{gc} is $-40\ \alpha\ dB/decade$, where, $\alpha = 0.7$. ***1 point***

- 8.5 rad/s
- 5.3 rad/s
- 2.5 rad/s
- 7.6 rad/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
5.3 rad/s

6) For Q5 calculate the gain-margin (GM) if the same roll-off rate of $-40\ \alpha\ dB/decade$ exists between the gain-crossover and phase-crossover frequencies. ***1 point***

- 31.11 dB
- 11.11 dB
- 17.3 dB
- 15.55 dB

No, the answer is incorrect.
Score: 0

Accepted Answers:
17.3 dB

7) If there is no constraint on the roll-off rate (α) in Q5, calculate the maximum possible value for the gain cross-over frequency ($\omega_{gc,max}$). ***1 point***

- 301.2 rad/s
- 117.5 rad/s
- 120 rad/s
- 118.1 rad/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
118.1 rad/s

8) In what way does a time delay e^{-sT} affect the performance of a closed loop control system? ***1 point***

- Increases the phase margin.
- Reduces the gain margin.
- Increases the gain cross-over frequency
- Reduces the gain cross-over frequency.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Reduces the gain margin.

9) A certain loo gain L(s) with all its zeros and poles on the left half of the s-plane is cascaded with a time delay e^{-sT}, where T=25 ms. The loop gain is expected to have a phase margin of 40°. Calculate the value of gain cross-over frequency (ω_{gc}) if the roll-off rate near ω_{gc} is $-40\ \alpha\ dB/decade,\ where,\ \alpha = 0.7.$ ***1 point***

- 9.77 rad/s
- 8.65 rad/s
- 7.52 rad/s
- 7.6 rad/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
9.77 rad/s

10) If there is no constraint on the roll-off rate (α) in Q9, calculate the maximum possible value for the gain cross-over frequency ($\omega_{gc,max}$). ***1 point***

- 89.11 rad/s
- 111.1 rad/s
- 97.7 rad/s
- 107.7 rad/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
97.7 rad/s

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