Unit 7 - Week 5

Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-09-04, 23:59 IST.

1) If all roots of a polynomial lie in the left half of the complex plane, then that polynomial is called *1 point*

- a Routh polynomial
- a Hurwitz polynomial
- a Bode polynomial
- a Nyquist polynomial

No, the answer is incorrect.
Score: 0

Accepted Answers:
a Hurwitz polynomial

2) The polynomial $s^2 + (K-1)s + (K-2)$ where K is a real valued parameter, has all its roots in the left half complex plane for all *1 point*

- $K < 1$
- $K > 2$
- $K > 1$
- $K < 2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$K > 2$

3) The polynomial $s^3 + 8s^2 + 22s + 20$ has *1 point*

- all its 3 roots in the left half complex plane
- 2 roots in the left half complex plane and 1 root in the right half complex plane
- 1 root in the left half complex plane and 2 roots in the right half complex plane
- all its 3 roots in the right half complex plane

No, the answer is incorrect.
Score: 0

Accepted Answers:
all its 3 roots in the left half complex plane

4) The polynomial $s^3 + 5s^2 + 2s + 12$ has *1 point*

- all its 3 roots in the left half complex plane
- 2 roots in the left half complex plane and 1 root in the right half complex plane
- 1 root in the left half complex plane and 2 roots in the right half complex plane
- all its 3 roots in the right half complex plane

No, the answer is incorrect.
Score: 0

Accepted Answers:
1 root in the left half complex plane and 2 roots in the right half complex plane

5) The polynomial $s^4 + 3s^2 + 6s^2 + 12s + 8$ has *0 points*

- all its 4 roots in the left half complex plane
- 2 roots on the imaginary axis
- 2 roots in the right half complex plane

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3 roots in the right half complex plane

No, the answer is incorrect.
Score: 0

Accepted Answers:
2 roots on the imaginary axis

6) Consider a second order plant governed by $\ddot{y}(t) + 4y(t) = u(t)$ It is desired to design a unity negative feedback closed loop control system with this plant. Which ONE of the following statements is TRUE? ***1 point***

- The closed loop system can be stabilized with a proportional controller
- The closed loop system can be stabilized with an integral controller
- The closed loop system can be stabilized with a proportional-integral controller
- The closed loop system can be stabilized with a proportional-derivative controller

No, the answer is incorrect.
Score: 0

Accepted Answers:
The closed loop system can be stabilized with a proportional-derivative controller

7) It is desired that a closed loop system should have a settling time below 1 s. This requires that the real part of the closed loop poles be less than ***1 point***

- -0.5
- -2
- -4
- -1

No, the answer is incorrect.
Score: 0

Accepted Answers:
-4

8) It is desired that a closed loop system should have a maximum peak overshoot below 15 %. This requires that the damping ratio of the system be at least ***1 point***

- 0.456
- 0.228
- 0.114
- 0.517

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.517

9) In problem 6, the constraints on the controller parameters of a proportional-derivative controller that would always stabilize the closed loop system are ***1 point***

- $K_p > -4$ and $K_d > 0$
- $K_p < 4$ and $K_d > -4$
- $K_p > 0$ and $K_d > -4$
- $K_p < 0$ and $K_d > 4$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$K_p > -4$ *and* $K_d > 0$

10) Consider a second order plant governed by $\ddot{y}(t) + 3\dot{y}(t) - 2y(t) = u(t)$ It is desired to design a unity negative feedback closed loop control system with this plant using a proportional controller. The closed loop system would be stable for all ***1 point***

- $K_p > 0$
- $K_p < 3$
- $K_p > -3$
- $K_p > 2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$K_p > 2$

11) In problem 10, the ratio of E(s) to R(s) is ***1 point***

- $\frac{K_p}{s^2 + 3s - 2}$
-

$$\frac{s^2 + 3s - 2}{s^2 + 3s + K_p - 2}$$

$$\frac{1}{s^2 + 3s + K_p - 2}$$

$$\frac{1}{s^2 + 3s + K_p}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\frac{s^2 + 3s - 2}{s^2 + 3s + K_p - 2}$$

12) In problem 10), the steady state tracking error when the stable closed loop system is given a unit step reference input is *1 point*

- $-K_p/2$
- $2/(2 - K_p)$
- $3/K_p$
- 0

No, the answer is incorrect.
Score: 0

Accepted Answers:
$2/(2 - K_p)$

13) In problem 10, it is now desired that the real part of all closed loop poles be less than -1. The range of the proportional gain that would satisfy this requirement is *1 point*

- $K_p > 1$
- $K_p > 3$
- $K_p > 4$
- $K_p > 2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$K_p > 4$

14) The open loop transfer function corresponding to problem 10 is of *1 point*

- Type 0
- Type 1
- Type 2
- Type 3

No, the answer is incorrect.
Score: 0

Accepted Answers:
Type 0

15) The characteristic polynomial of a closed loop system is $s^3 + Ks^2 + 2s + 1$ where *K* is a real parameter. Then, the closed loop system is stable for all *1 point*

- $K > 1$
- $K > 2$
- $K > 0$
- $K > -2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$K > 1$