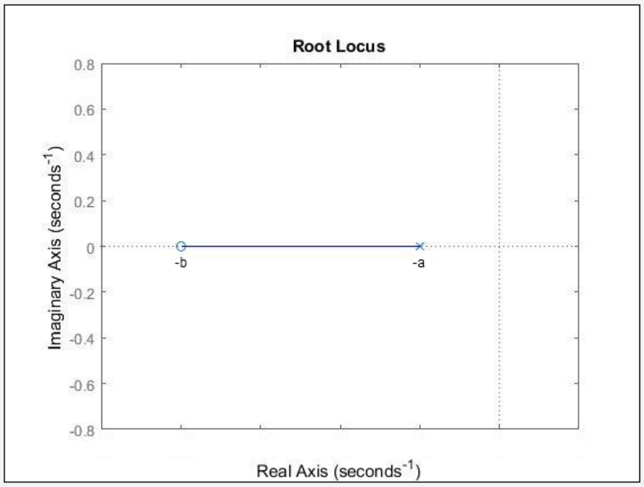
Question 1

0 out of 10 points



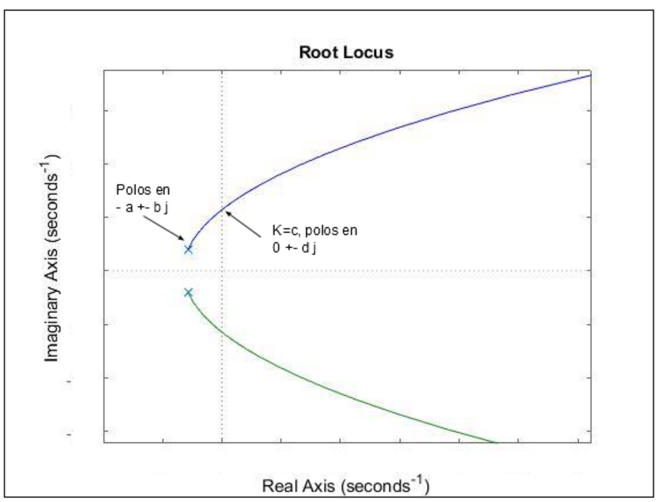
Assume a system with the previous root locus diagram. Let a=6 and b=28.

Also, assume that the Kp of the system is 4. Designn a proportional controller that places the pole in closed loop in s=-16.

Provide your answer with 3 decimal.

Question 2

2 out of 2 points



(Figure: Polos en= Poles in)

Let a=4.32, b=26.82, c=14.34 y d=45.

Determine the natural frequency of the system in open loop. Assume that the system has a root locus diagram such as the one in the previous Figure. Provide your answer with 3 decimal.

Question 3

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{(s+b)(s+c)}$$

$$C(s) = \frac{Ps + I + Ds^2}{s}$$

Reference $r(t) = t$

with values a=16, b=17, c=17, P=19, I=6, D=2.

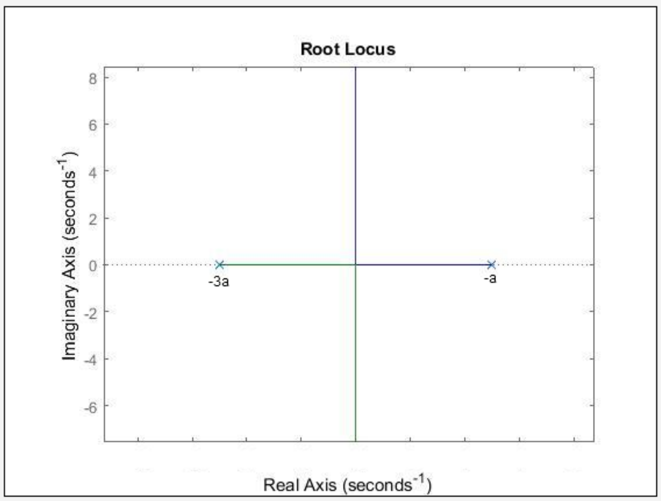
Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 4

6 out of 6 points



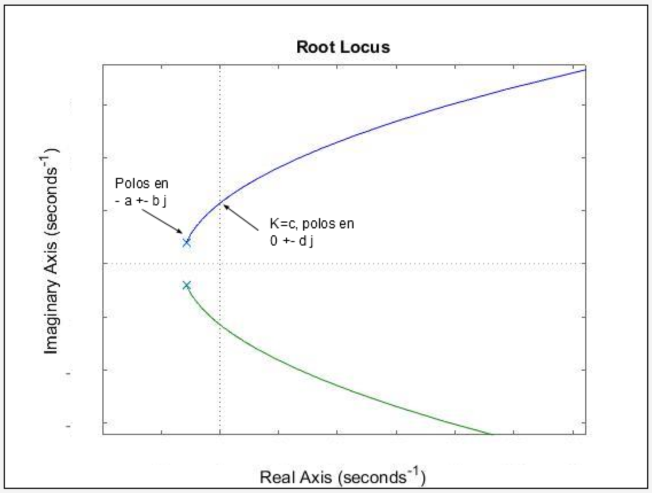
Let a=11 and a system with the previous root locus diagram. Let the numerator of the transfer function of the system be N(s)=10.

Determine the value of a proportional controller that places the poles in cosed loop in s=-2(11)+- 10j.

Provide your answer with three decimal. If you cannot find such gain, make your answer equal to 1000000. (1,000,000 without any comma or symbol).

Question 5

2 out of 2 points



(Figure: Polos en= Poles in)

Let a=9.92, b=24.96, c=17.64 y d=48.

Determine the peak time of a system that has the previous root locus diagram. Present your answer with 3 decimal.

Question 6

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{s(s+b)(s+c)}$$

$$C(s) = \frac{Ps + I + Ds^2}{s}$$

Reference $r(t) = t$

with values a=12, b=10, c=15, P=15, I=40, D=3.

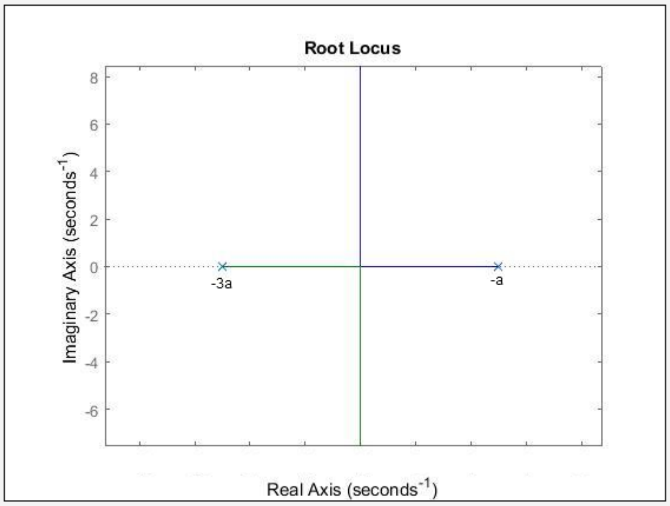
Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 7

6 out of 6 points



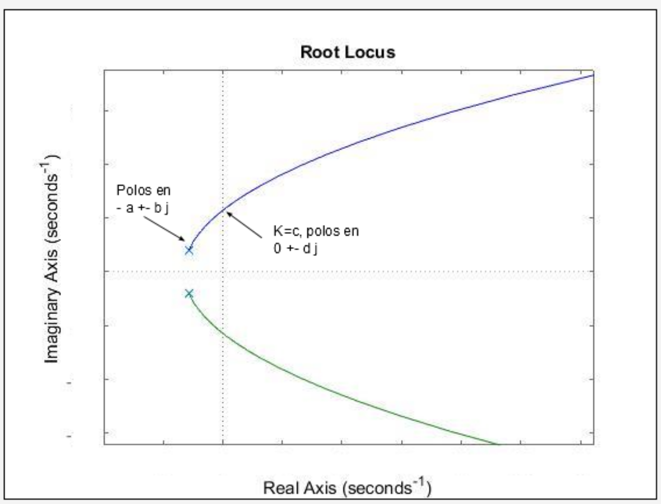
Let a=6 and a system with the previous root locus diagram. Let the numerator of the transfer function of the system be N(s)=20.

Determine the value of a proportional controller that places the poles in cosed loop in s=-4+- 10j.

Provide your answer with three decimal. If you cannot find such gain, make your answer equal to 1000000. (1,000,000 without any comma or symbol).

Question 8

2 out of 2 points



(Figure: Polos en= Poles in)

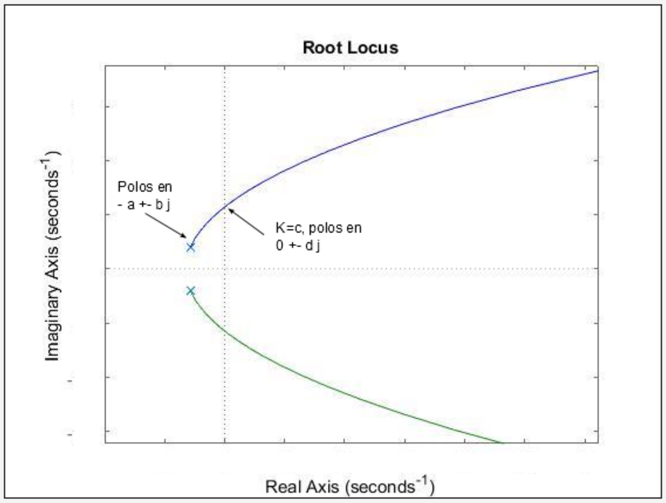
Let a=11, b=36, c=14 y d=40.

Assume a system with the previous root locus diagram. Is it possible to design a PID using the damped oscillations method for such system?

Answer 1 for TRUE and -1 for FALSE.

Question 9

10 out of 10 points



(Polos en = Poles in)

Let a=7, b=14, c=197 y d=24.

Assume a system with a root locus diagram as the one in the previous Figure. Also, let the numerator of the transfer function of the system be N(s)=55.

Assume that the system is stable in closed loop with a compensator:

Assume that the system is stable in closed loop with a compensator:

$$C(s) = \frac{5(s+z)}{s+p}$$

with z=20 y p=48.

What is the Kp of a Lag compensator such that the steady state error is of 7%?

Write your answer with 3 decimal.

Question 10

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{s(s+b)(s+c)}$$

$$C(s) = K$$

Reference $r(t) = 1$

with values a=18, b=12, c=11, K=10.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 11

4 out of 4 points

$$G(s) = \frac{s-8}{s^6 + 7s^5 + 4s^4 + 5s^3 + 9s^2 + 15s + 22}$$

Determine if G(s) is stable in closed loop with a proportional controller K=7.45.

Stable = 1

Unstable = -1

Question 12

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{s(s+b)(s+c)}$$

$$C(s) = K$$

Reference $r(t) = t$

with values a=15, b=10, c=18, K=13.

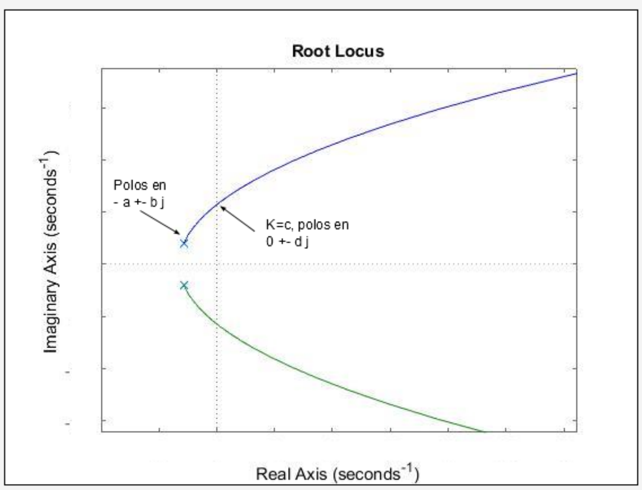
Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 13

2 out of 2 points



(Figure: Polos en= Poles in)

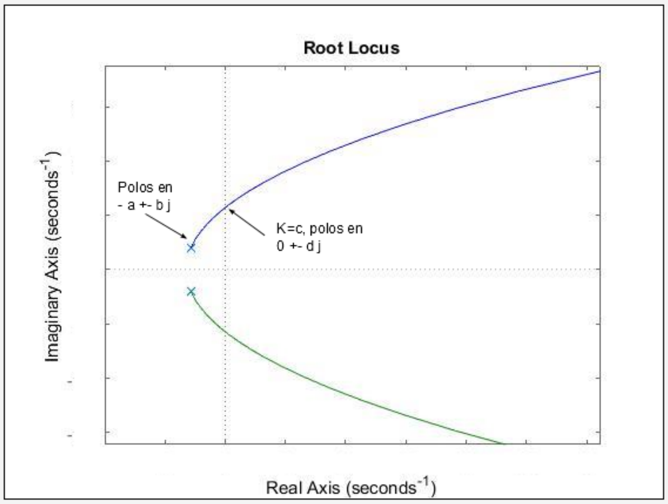
Let a=14, b=26, c=19 y d=35.

Assume a system with the previous root locus diagram. Is it possible to design a PID using the Damped oscillations method for such system?

Answer: 1 if it is TRUE and -1 if it is FALSE.

Question 14

2 out of 2 points



Let a=4.24, b=25.15, c=18.52 y d=35.

Determine the Damped Natural frecuency in open loop of a system with the previous root locus diagram.

Provide your answer with 3 decimals.

Question 15

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{(s+b)(s+c)}$$

$$C(s) = \frac{K(s+z1)(s+z2)}{(s+p1)(s+p2)}$$

Reference $r(t) = 1$

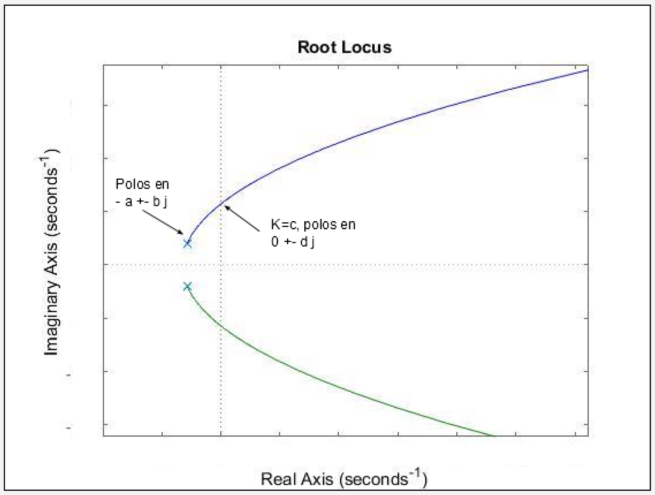
with values a=15, b=10, c=15, z1=39, z2=0.017, p1=57, p2=0.004, K=13.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 16 2 out of 2 points



(Figure: Polos en= Poles in)

Let a=4.62, b=27.06, c=11.74 y d=31.

Determine the settling time (with 2% criteria) of a system with the previous root locus diagram. Present your answer with 3 decimal.

Question 17 2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{(s+b)(s+c)}$$

$$C(s) = \frac{Ps + I + Ds^2}{s}$$

Reference $r(t) = 1$

with values a=10, b=10, c=18, P=17, I=9, D=2.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 18 2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{s(s+b)(s+c)}$$

$$C(s) = \frac{K(s+z)}{s+p}$$

Reference $r(t) = t$

with values a=10, b=19, c=16, K=11, z=27, p=48.

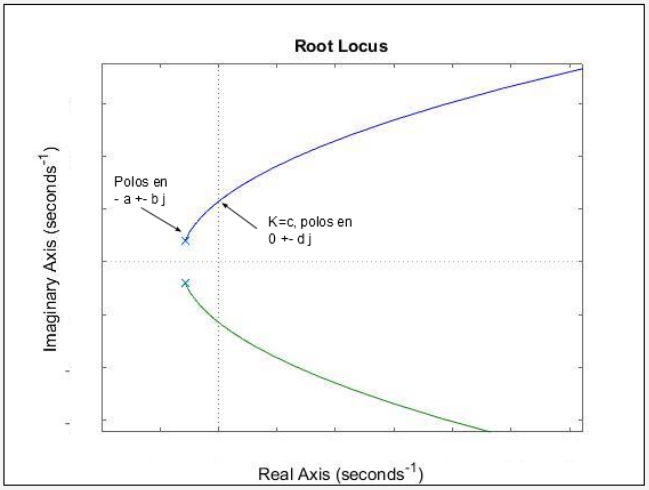
Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 19

10 out of 10 points



(Figure: Polos en= Poles in)

Let a=7, b=7, c=197 y d=24.

Assume a system with the previous root locus diagram. Also, let the numerator of the transfer function be N(s)=60.

Besides, assume that the system is stable in closed loop with a Lead compensator:

Besides, assume that the system is stable in closed loop with a Lead compensator:

$$C(s) = \frac{7(s+z)}{s+p}$$

with z=15 y p=47.

What is the error in steady state with a Unit step reference?

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

Question 20

2 out of 2 points

Assume a 2nd order system with a delay of 0/1000 time units.

Is it possible to design a PID with the Sustained (perpetual) oscillations method?

Answer 1 for TRUE and -1 for FALSE.

Question 21

4 out of 4 points

$$G(s) = \frac{s-8}{s^6 + 7s^5 + 4s^4 + 5s^3 + 9s^2 + 15s + 22}$$

Determine if G(s) is stable in closed loop with a controller C(s):

$$C(s) = \frac{4(s+z)}{(s+p)}$$

with z=21, p=14.

Stable = 1

Unstable = -1

Question 22

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{(s+b)(s+c)}$$

$$C(s) = K$$

Reference $r(t) = t$

with values a=10, b=17, c=10, K=10.

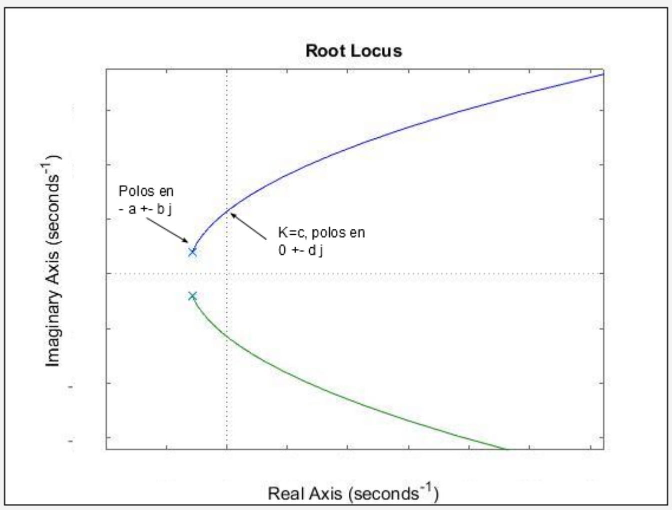
Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 23

2 out of 2 points



(Figure: Polos en= Poles in)

Let a=3.5, b=17.31, c=18.46 y d=37.

Determine the damping ratio of the system in open loop. Assume that the system has the previous root locus diagram. Present your result with three decimals.

Question 24

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{s(s+b)(s+c)}$$

$$C(s) = \frac{K(s+z1)(s+z2)}{(s+p1)(s+p2)}$$

Reference $r(t) = 1$

with values a=10, b=12, c=19, K=11, z1=27, z2=0.019, p1=49, p2=0.001.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 25

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{(s+b)(s+c)}$$

$$C(s) = K$$

Reference $r(t) = 1$

with values a=10, b=16, c=14, K=14.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 26

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{(s+b)(s+c)}$$

$$C(s) = \frac{K(s+z1)(s+z2)}{(s+p1)(s+p2)}$$

Reference $r(t) = t$

with values a=13, b=16, c=13, z1=37, z2=0.01, p1=77, p2=0.003, K=14.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 27

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{(s+b)(s+c)}$$

$$C(s) = \frac{K(s+z)}{s+p}$$

Reference $r(t) = 1$

with values a=18, b=11, c=12, z=25, p=71, K=14.

Assume that the system is stable with the proposed controller.
Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234
If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 28

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{s(s+b)(s+c)}$$

$$C(s) = \frac{K(s+z)}{s+p}$$

Reference $r(t) = 1$

with values a=18, b=14, c=10, K=12, z=28, p=48.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 29

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{s(s+b)(s+c)}$$

$$C(s) = \frac{Ps + I + Ds^2}{s}$$

Reference $r(t) = 1$

with values a=16, b=13, c=16, P=18, I=49, D=1.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 30 2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{s(s+b)(s+c)}$$

$$C(s) = \frac{K(s+z1)(s+z2)}{(s+p1)(s+p2)}$$

Reference $r(t) = t$

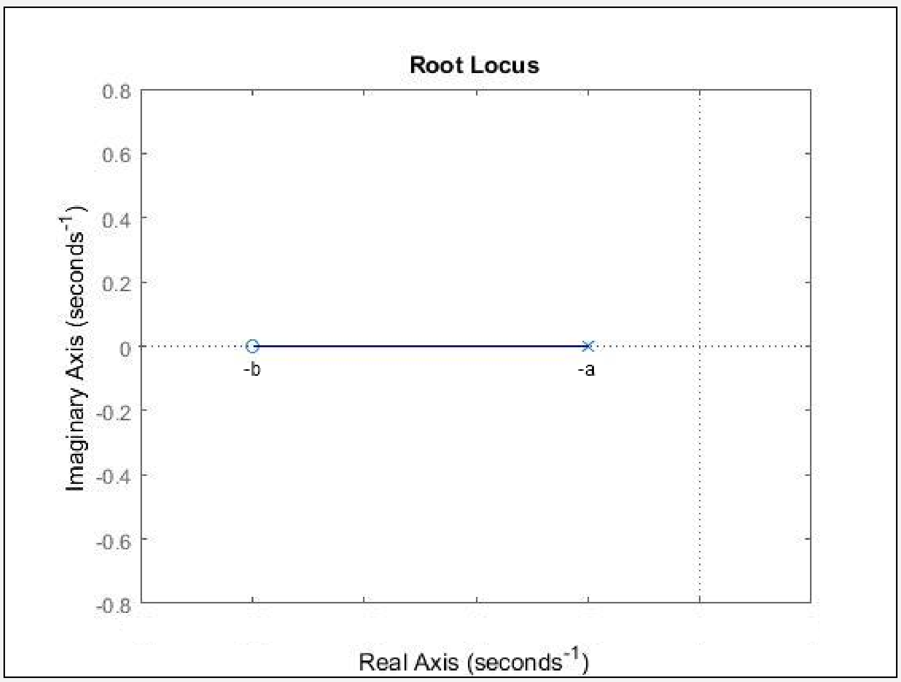
with values a=11, b=19, c=18, K=10, z1=29, z2=0.019, p1=48, p2=0.001.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)

Question 31



Assume a system with the previous root locus diagram, with a=5 and b=34.

Is it possible to place a pole in closed loop in s= -52 with a proportional controller?

ANSWER:

TRUE= 1

FALSE= -1

Question 32

2 out of 2 points

Determine the steady state error for the next set of System (G(s)), Controller (C(s)) and reference (r(t)):

$$G(s) = \frac{a}{(s+b)(s+c)}$$

$$C(s) = \frac{K(s+z)}{s+p}$$

Reference $r(t) = t$

with values a=12, b=19, c=17, z=29, p=57, K=11.

Assume that the system is stable with the proposed controller.

Provide your answer with 3 decimals as part of the unit. For instance, for a 10% error the answer to provide would be 0.100; for a 23.4% error, the answer would be 0.234

If the result is infinity, write an answer equal to 1000000 (1,000,000 without commas or any symbol)