Homework

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Midterm Project

Problem 1

(a)

(b)

(c)

(d)

Problem 2
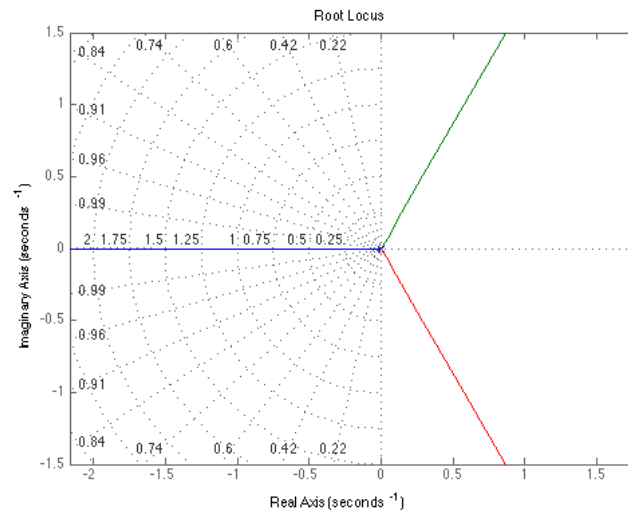
(a)

(b)

(c)

(d)

(e)

(f)

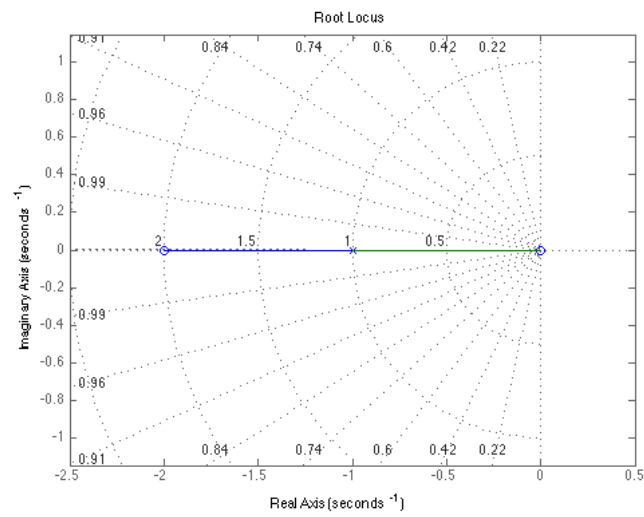**(g)**

Homework 7

Problem 1

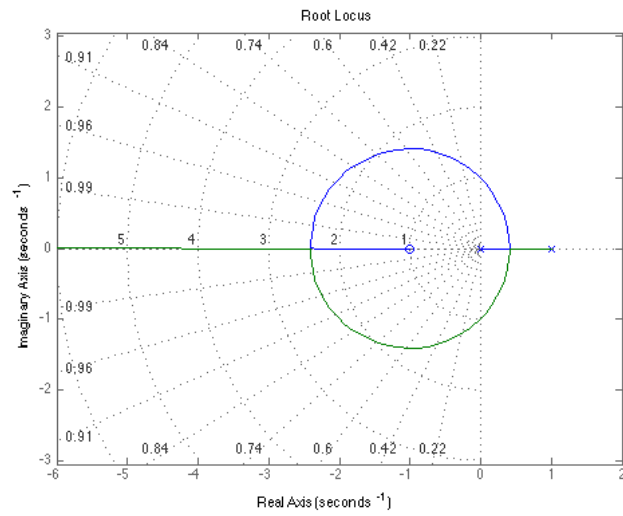Root-locus plots of the following functions. . .

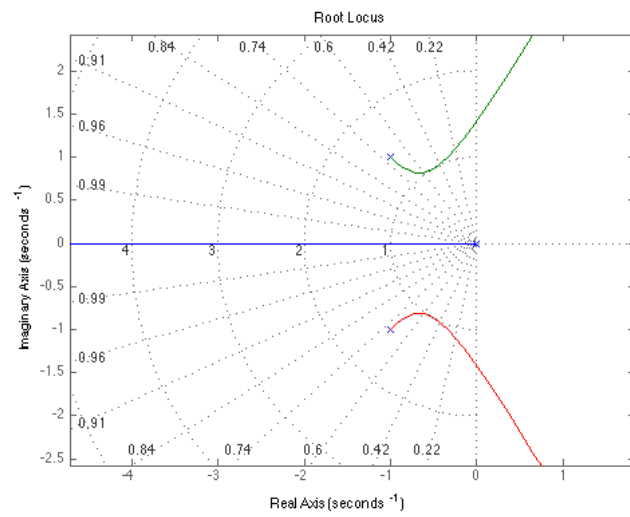**(a)**

$$G(s) = \frac{1}{(s+0)^3}$$

(b)

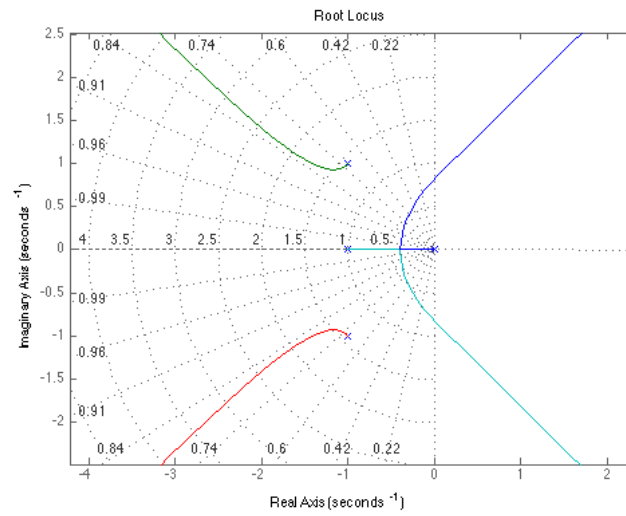$$G(s) = \frac{(s+0)(s+2)}{(s+1)^2}$$

(c)

$$G(s) = \frac{s+1}{(s+0)(s-1)}$$
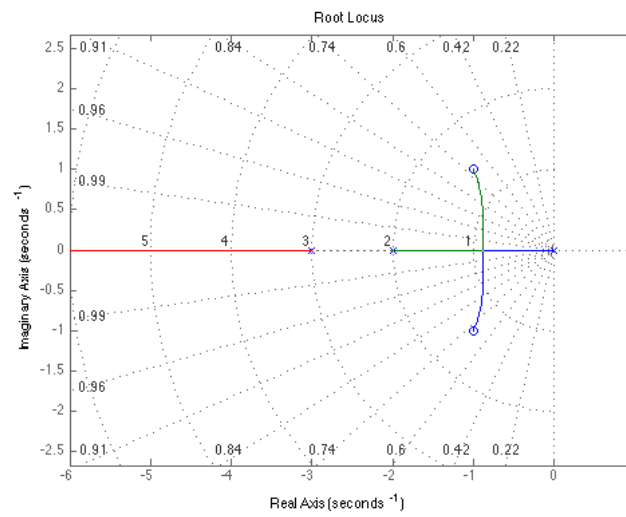
(d)

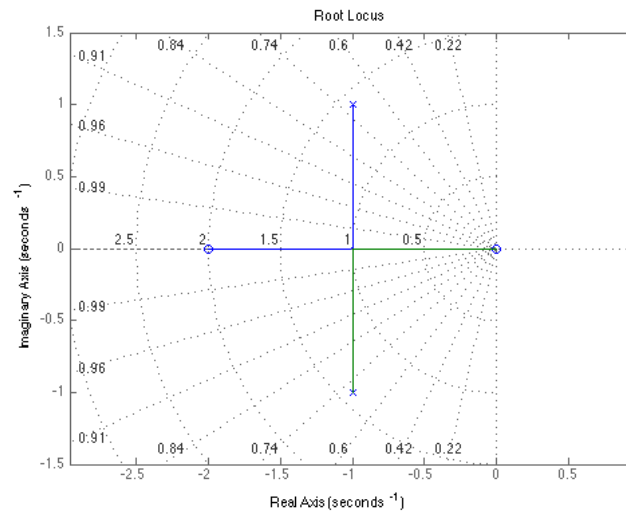$$G(s) = \frac{1}{(s+0)(s+1+i)(s+1-i)}$$

3

(e)

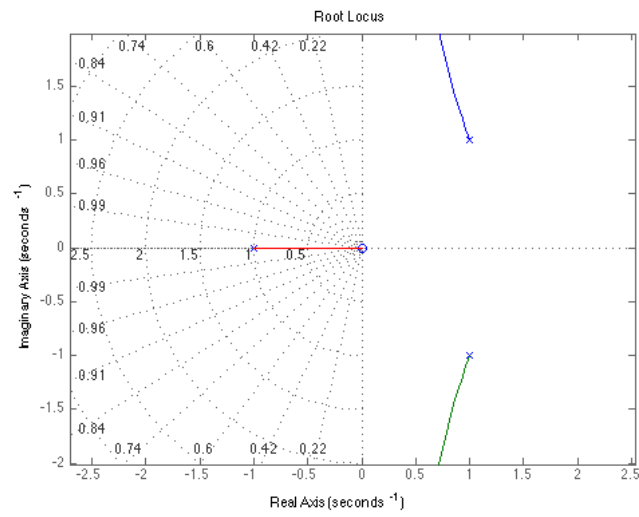$$G(s) = \frac{1}{(s+0)(s+1+i)(s+1-i)(s+1)}$$

(f)

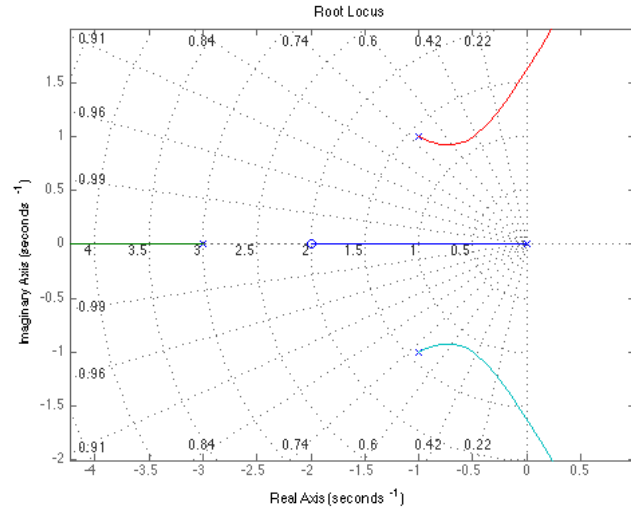$$G(s) = \frac{(s+1-i)(s+1+i)}{(s+0)(s+2)(s+3)}$$

4

(g)

$$G(s) = \frac{(s+0)(s+2)}{(s+1-i)(s+1+i)}$$

(h)

$$G(s) = \frac{(s+0)}{(s+1)(s-1-i)(s-1+i)}$$

5

(i)

$$G(s) = \frac{(s+2)}{(s+0)(s+3)(s+1-i)(s+1+i)}$$

Problem 4

First we apply our reduction rules to the system as follows:

$$G(s) = \frac{20}{(s+1)(s+4)}$$

$$= \frac{\dfrac{20}{(s+1)(s+4)}}{1 + \dfrac{20}{(s+1)(s+4)} \times K}$$

$$= \frac{20}{s^2 + 5s + 4 + 20K} \times \frac{1}{s}$$

$$= \frac{\dfrac{20}{s^3 + 5s^2 + 4s + 20Ks}}{1 + \dfrac{20}{s^3 + 5s^2 + 4s + 20Ks}}$$

$$= \frac{20}{s^3 + 5s^2 + 4s + 20Ks + 20}$$

Problem 5