

Homework 2

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Question 1

i. (a)

$$G(s) = \frac{4s - 8}{s^2 + 2s - 9}$$

$$\text{DC GAIN} = G(0) = \frac{-8}{-9}$$

(b)

$$G(s) = \frac{10}{s^2 + 2s + 10}$$

$$\text{DC GAIN} = G(0) = \frac{10}{10} = 1$$

ii. (a)

$$N(0) = s^2 + 2s - 9 = 0$$

$$\text{Poles: } s = -1 \pm \sqrt{10}$$

$\text{Real}(s) = -1 < 0$, so this system is stable.

(b)

$$N(0) = s^2 + 2s + 10 = 0$$

$$\text{Poles: } s = -1 \pm 3i$$

$\text{Real}(s) = -1 < 0$, so this system is stable.

iii. (a) (b)

iv. (a) (b)

v. (a) (b)