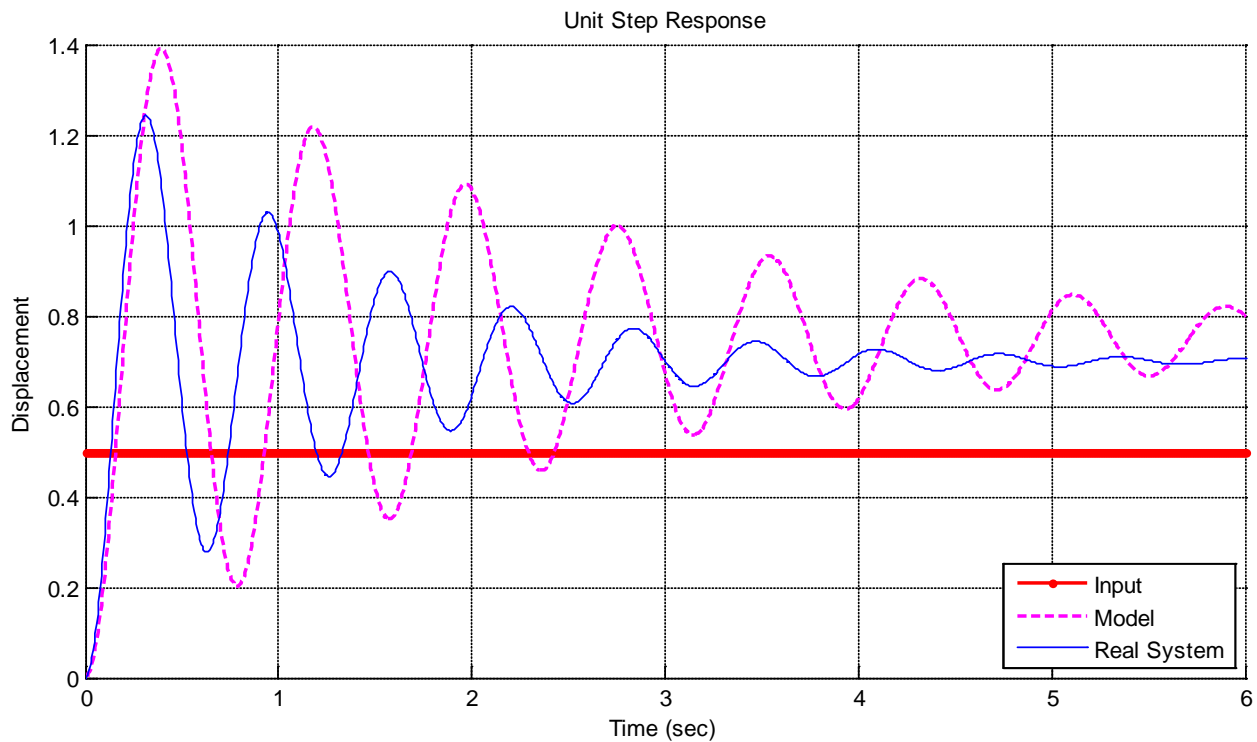


Problems 6-8 refer to the figure below, which shows the unit step response of a real 2nd order system and the unit step response of a second order model we are trying to match to the real system.



6) In order to make the model better match the real system, the *damping ratio* of the *model* should be

- a) increased b) decreased c) left alone d) impossible to determine

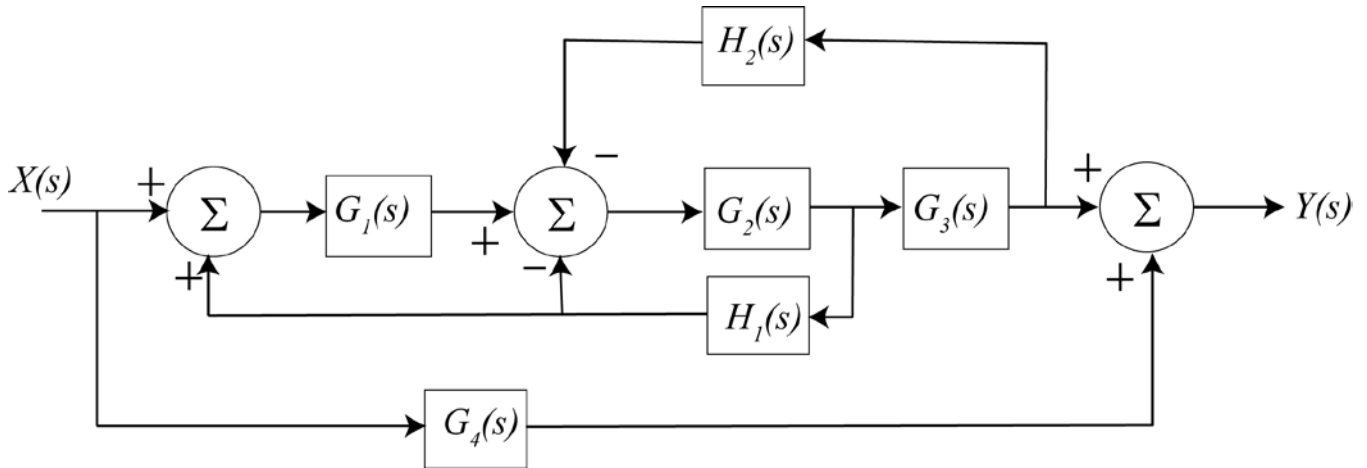
7) In order to make the model better match the real system, the *natural frequency* of the *model* should be

- a) increased b) decreased c) left alone d) impossible to determine

8) In order to make the model better match the real system, the *static gain* of the *model* should be

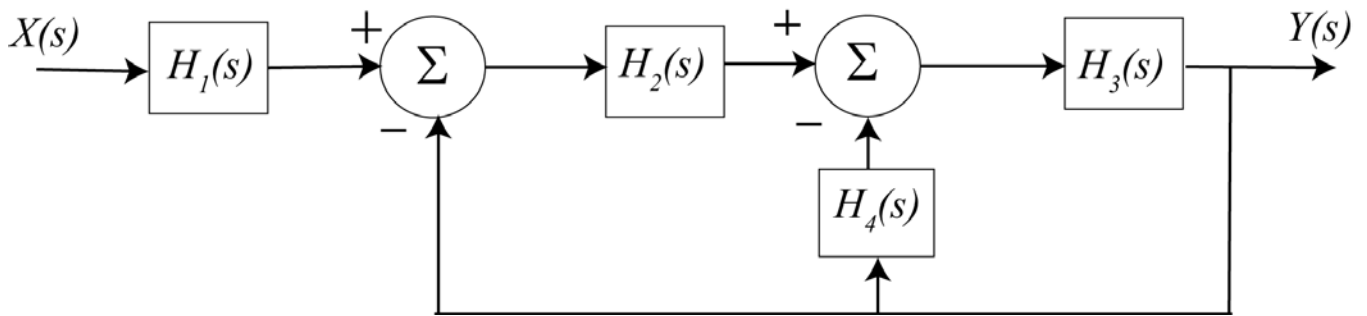
- a) increased b) decreased c) left alone d) impossible to determine

Problems 9 – 11 refer to the signal flow graph representation of the following block diagram.



- 9) How many **paths** are there? a) 0 b) 1 c) 2 d) 3 e) 4
- 10) How many **loops** are there? a) 0 b) 1 c) 2 d) 3 e) 4
- 11) Are any of the **cofactors** equal to 1? a) yes b) no

For problems 12 – 15 consider the signal flow graph representation of the following block diagram.



- 12) How many **paths** are there? a) 0 b) 1 c) 2 d) 3 e) 4
- 13) How many **loops** are there? a) 0 b) 1 c) 2 d) 3 e) 4
- 14) The **determinant** (Δ) is a) 1 b) $1 - H_2H_3 - H_3H_4$ c) $1 + H_2H_3 + H_3H_4$ d) none of these
- 15) The **transfer function** is a) 1 b) $\frac{H_1H_2H_3}{1 - H_2H_3 - H_3H_4}$ c) $\frac{H_1H_2H_3}{1 + H_2H_3 + H_3H_4}$