ME 460/660 Exam Solns

1) Amplitude @ $t=0$ is 0.5

Amplitude @ $t=10$ is 0.04

This is ~50 cycles

$$T = \frac{10}{50} = 0.2 \text{ sec}$$

$$\omega_n = \frac{2\pi}{.2} = 10\pi$$

$$\omega_n^2 = \frac{k}{m}$$

$$m = \frac{100}{100\pi^2} = 0.1 \text{ kg}$$

$$\delta = \frac{1}{50} \ln \frac{0.5}{0.04} = 0.051$$

$$\zeta = \frac{\delta}{2\pi} = 0.008$$

$$c = 2\zeta\omega_n m = 0.05 \text{ kg/s}$$

2) $$H = \frac{X}{Y} = \frac{20 + 0.1j\omega}{10{,}000 - 10\omega^2 + 3j\omega}$$