

ENSC383: Feedback Control Systems
 School of Engineering Science, Simon Fraser University
 Fall 2007, Quiz 3

Name: _____

Obtain the root locus for closed loop poles of a system consisting of a plant with transfer function $\frac{1}{s^2}$ and controller $K(s+z)/(s+p)$ when K varies from zero to infinity for the following cases: (i) $z=2, p=4$ and (ii) $z=4, p=2$.

$$1 + K \frac{s+z}{s^2(s+p)} = 0 \leftarrow \text{char. eq.}$$

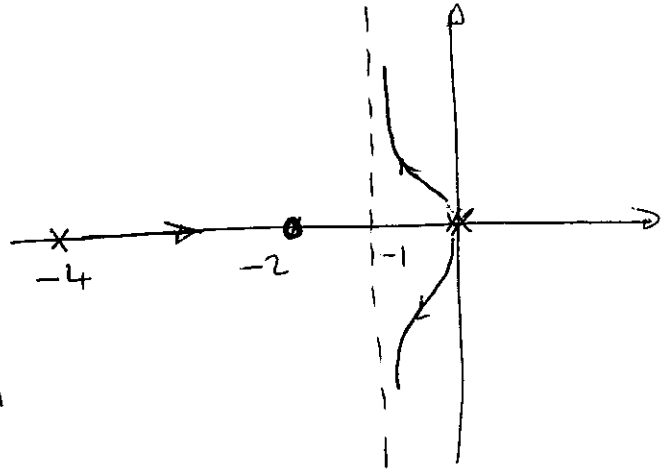
(i) $z=2, p=4$

Asymptotes:

$$\text{intercept } \sigma = \frac{\sum \text{poles} - \sum \text{zeros}}{n - m}$$

$$= \frac{-4 - (-2)}{2} = -1$$

$$\text{angle} = \frac{180 + 360l}{2} = \pm 90^\circ$$



(ii) $z=4, p=2$

$$\sigma = \frac{-2 - (-4)}{2} = 1$$

$$\text{angle} = \pm 90^\circ$$

