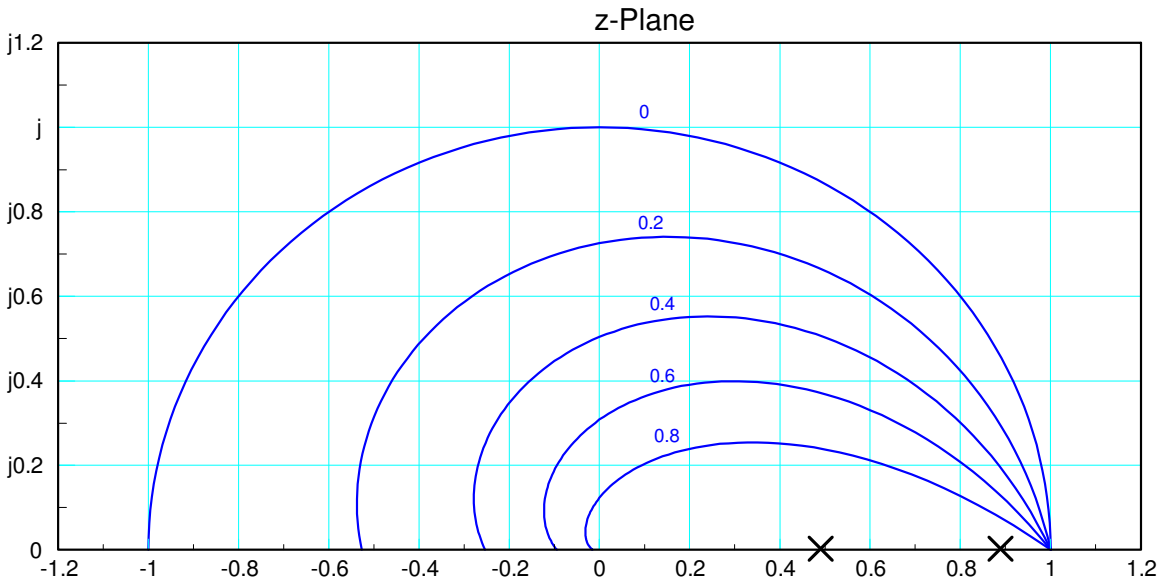
ECE 461/661 Handout #32

PID control in the z-plane

Design a PI compensator for

$$G(z) = \left(\frac{0.1}{(z-0.9)(z-0.5)} \right)$$

that results in a damping ratio of 0.4



Solution

$$G(z) = \left(\frac{0.1}{(z-0.9)(z-0.5)}\right)$$

$$K(z) = k\left(\frac{z-0.9}{z-1}\right)$$

giving the following root locus

$$z = 0.75 + j0.35$$

$$GK = \left(\frac{0.1}{(z-1)(z-0.5)}\right)_{z=0.75+j0.35} = 0.5405\angle 180^0$$

$$k = \frac{1}{0.5405} = 1.85$$

$$K(z) = 1.85\left(\frac{z-0.9}{z-1}\right)$$