

Name \_\_\_\_\_

**Example 1 from p. 90 of Bodson text**

$$G(s) = \frac{1}{s \cdot (s + 2)}$$

$$p_1 := 0 \quad p_2 := -2$$

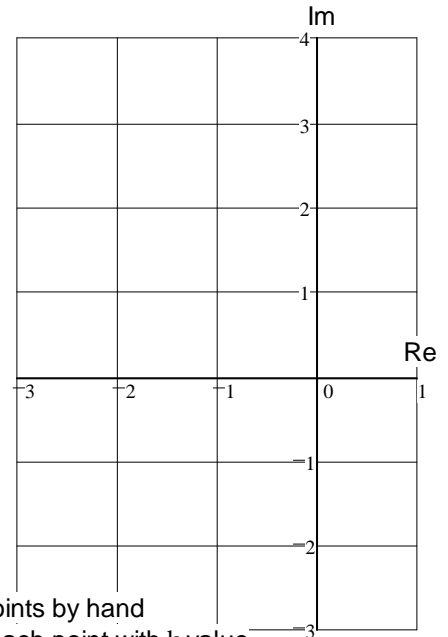
$$H(s) = \frac{k \cdot \frac{1}{s \cdot (s + 2)} \cdot \frac{s \cdot (s + 2)}{1 + k \cdot \frac{1}{s \cdot (s + 2)}}$$

$$\text{denominator: } s \cdot (s + 2) + k = s^2 + 2 \cdot s + k = 0$$

$$s_1(k) := \frac{-2 - \sqrt{2^2 - 4 \cdot k}}{2}$$

$$s_2(k) := \frac{-2 + \sqrt{2^2 - 4 \cdot k}}{2}$$

k := 0	$s_1(k) =$ _____	$s_2(k) =$ _____
k := 0.1	$s_1(k) = -1.949$	$s_2(k) = -0.051$
k := 0.2	$s_1(k) =$ _____	$s_2(k) =$ _____
k := 0.5	$s_1(k) = -1.707$	$s_2(k) = -0.293$
k := 0.8	$s_1(k) = -1.447$	$s_2(k) = -0.553$
k := 1	$s_1(k) =$ _____	$s_2(k) =$ _____
k := 2	$s_1(k) = -1 - j$	$s_2(k) = -1 + j$
k := 5	$s_1(k) = -1 - 2j$	$s_2(k) = -1 + 2j$
k := 10	$s_1(k) =$ _____	$s_2(k) =$ _____
k := 100	$s_1(k) = -1 - 9.95j$	$s_2(k) = -1 + 9.95j$



Plot points by hand  
label each point with k value

**Example 2 from p. 91 of text**

$$G(s) = \frac{s + 1}{s \cdot (s + 2)}$$

$$z_1 := -1 \quad p_1 := 0 \quad p_2 := -2$$

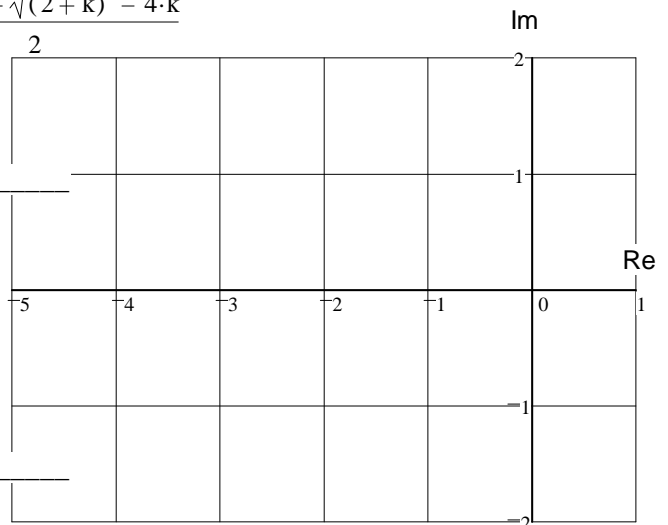
$$H(s) = \frac{k \cdot \frac{s + 1}{s \cdot (s + 2)} \cdot \frac{s \cdot (s + 2)}{1 + k \cdot \frac{s + 1}{s \cdot (s + 2)}}$$

$$\text{denominator: } = \text{_____} = 0$$

$$s_1(k) := \frac{-(2 + k) - \sqrt{(2 + k)^2 - 4 \cdot k}}{2}$$

$$s_2(k) := \frac{-(2 + k) + \sqrt{(2 + k)^2 - 4 \cdot k}}{2}$$

k := 0	$s_1(k) = -2$	$s_2(k) = 0$
k := 0.1	$s_1(k) = -2.051$	$s_2(k) = -0.049$
k := 0.2	$s_1(k) =$ _____	$s_2(k) =$ _____
k := 0.5	$s_1(k) = -2.281$	$s_2(k) = -0.219$
k := 0.8	$s_1(k) = -2.477$	$s_2(k) = -0.323$
k := 1	$s_1(k) = -2.618$	$s_2(k) = -0.382$
k := 2	$s_1(k) = -3.414$	$s_2(k) = -0.586$
k := 5	$s_1(k) = -6.193$	$s_2(k) = -0.807$
k := 10	$s_1(k) =$ _____	$s_2(k) =$ _____
k := 100	$s_1(k) = -101.01$	$s_2(k) = -0.99$



Plot points by hand

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Example 3 from p92 of text

$$G(s) = \frac{s+2}{s \cdot (s+1)} \quad \begin{array}{l} z_1 := -2 \\ p_1 := 0 \quad p_2 := -1 \end{array}$$

$$H(s) = \frac{k \cdot (s+2)}{s \cdot (s+1) + k \cdot (s+2)}$$

$$\begin{aligned} \text{denominator: } s \cdot (s+1) + k \cdot (s+2) &= 0 \\ s^2 + s + k \cdot s + 2 \cdot k &= 0 \\ s^2 + (1+k) \cdot s + 2 \cdot k &= 0 \end{aligned}$$

$$s_1(k) = \underline{\hspace{10em}}$$

$$s_2(k) = \underline{\hspace{10em}}$$

k := 0	s <sub>1</sub> (k) = _____
k := 0.1	s <sub>1</sub> (k) = -0.87
k := 0.17157	s <sub>1</sub> (k) = -0.588
k := 0.172	s <sub>1</sub> (k) = -0.586 - 0.025j
k := 0.2	s <sub>1</sub> (k) = -0.6 - 0.2j
k := 0.5	s <sub>1</sub> (k) = -0.75 - 0.661j
k := 0.8	s <sub>1</sub> (k) = -0.9 - 0.889j
k := 1	s <sub>1</sub> (k) = _____
k := 3	s <sub>1</sub> (k) = -2 - 1.414j
k := 5	s <sub>1</sub> (k) = -3 - j
k := 5.827	s <sub>1</sub> (k) = -3.414 - 0.045j
k := 7	s <sub>1</sub> (k) = -5.414
k := 10	s <sub>1</sub> (k) = -8.702
k := 100	s <sub>1</sub> (k) = -98.979

s <sub>2</sub> (k) = _____
s <sub>2</sub> (k) = -0.23
s <sub>2</sub> (k) = -0.584
s <sub>2</sub> (k) = -0.586 + 0.025j
s <sub>2</sub> (k) = -0.6 + 0.2j
s <sub>2</sub> (k) = -0.75 + 0.661j
s <sub>2</sub> (k) = -0.9 + 0.889j
s <sub>2</sub> (k) = _____
s <sub>2</sub> (k) = -2 + 1.414j
s <sub>2</sub> (k) = -3 + j
s <sub>2</sub> (k) = -3.414 + 0.045j
s <sub>2</sub> (k) = -2.586
s <sub>2</sub> (k) = -2.298
s <sub>2</sub> (k) = -2.021

Plot points by hand below

