

1) b) ~~Kass~~

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Führ:  $\frac{y}{w}$ ,  $D=0$ ,  $(w-y) \cdot K_g = y$

Stör:  $\frac{y}{d}$ ,  $w=0$ ,  $(-yK + D) \cdot \bar{s} = y$

Führ:

$$(w-y) \cdot K_g = y \quad y = K_g w - K_g y \quad | : y$$

$$1 = K_g \cdot \frac{w}{y} - K_g \quad | + K_g$$

$$1 + K_g = K_g \cdot \frac{w}{y} \quad | : K_g$$

$$\frac{1 + K_g}{K_g} = \frac{w}{y}$$

$$\boxed{\frac{y}{w} = \frac{K_g}{1 + K_g}}$$

+

Stör:

$$(-yK + d) \cdot \bar{s} = y \quad y = -s y K + s d \quad | : y$$

$$1 = -sK + s \cdot \frac{d}{y} \quad | + sK$$

$$1 + sK = s \cdot \frac{d}{y} \quad | : s$$

$$\frac{1 + sK}{s} = \frac{d}{y}$$

$$\boxed{\frac{y}{d} = \frac{s}{1 + sK}}$$

a) P-regler, PD-regler, PT~~2~~

grenzstabil, keine osz. anteil da kein j.

1) b) Führ:

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$$\frac{y}{w} = \frac{K_g}{1+K_g} = \frac{K \cdot \frac{1}{s \cdot (s+1)}}{1 + \frac{K}{s \cdot (s+1)}} = \frac{\left( \frac{K}{s \cdot (s+1)} \right)}{\left( \frac{s \cdot (s+1) + K}{s \cdot (s+1)} \right)}$$

$$= \boxed{\frac{K}{s^2 + s + K}}$$

$$\frac{y}{w} = \frac{K_g}{1+K_g} = \frac{\left( \frac{K+11s}{s \cdot (s+1)} \right)}{1 + \frac{K+11s}{s \cdot (s+1)}} = \frac{\left( \frac{K+11s}{s \cdot (s+1)} \right)}{\left( \frac{s \cdot (s+1) + K+11s}{s \cdot (s+1)} \right)}$$

$$= \frac{K+11s}{s^2 + s + K+11s} = \boxed{\frac{K+11s+K}{s^2 + 12s + K}}$$

Stör:

$$\frac{y}{d} = \frac{g}{1+gk} = \frac{\frac{1}{s(s+1)}}{1 + \frac{K}{s \cdot (s+1)}} = \frac{\left( \frac{1}{s(s+1)} \right)}{\left( \frac{s(s+1) + K}{s(s+1)} \right)}$$

$$= \boxed{\frac{1}{s^2 + s + K}}$$

$$\frac{y}{d} = \frac{\left( \frac{1}{s(s+1)} \right)}{\left( \frac{s \cdot (s+1) + K+11s}{s(s+1)} \right)} = \boxed{\frac{1}{s^2 + 12s + K}}$$

1) c)

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$$E_w(s) = \frac{1 - G_w(s)}{s}$$

$$\lim_{t \rightarrow \infty} e_w(t) = \lim_{s \rightarrow 0} s \cdot E_w(s)$$

für:

$$s \cdot \frac{1 - \frac{k}{s^2 + s + k}}{s} = 1 - \frac{k}{s^2 + s + k}$$

$$\lim_{s \rightarrow 0} 1 - \frac{k}{s^2 + s + k} = 1 - \frac{k}{k} = 1 - 1 = \boxed{0}$$

+

$$s \cdot \frac{1 - \frac{11s + k}{s^2 + 12s + k}}{s} = 1 - \frac{11s + k}{s^2 + 12s + k}$$

$$\lim_{s \rightarrow 0} 1 - \frac{11s + k}{s^2 + 12s + k} = 1 - \frac{k}{k} = 1 - 1 = \boxed{0}$$

d) +

Stör:

$$\lim_{s \rightarrow 0} 1 - \frac{1}{s^2 + s + k} = 1 - \frac{1}{k} = \boxed{\frac{k-1}{k}}$$

+

$$\lim_{s \rightarrow 0} 1 - \frac{1}{s^2 + 12s + k} = 1 - \frac{1}{k} = \boxed{\frac{k-1}{k}}$$

e) +

$$\frac{k-1}{k} < 0,01 \Rightarrow \frac{1}{k} < 0,99 \Rightarrow \boxed{k > \frac{100}{99}}$$