

$$\text{III)} \quad T(s) = \frac{s+2}{s^2+9}$$

zero at $s = -2$

$$s^2 = -9, \quad s = \pm 3i \rightarrow \text{poles, Undamped}$$

$$\mathcal{L}^{-1}[T(s)] = \cos(3t) + \frac{2\sin(3t)}{3}$$

General: $\cos(At) + B\sin(ct)$

$$\text{IV)} \quad T(s) = \frac{s+5}{(s+10)^2} = \frac{s+5}{s^2+20s+100}$$

zero at $s = -5$

$$s = \frac{-20 \pm \sqrt{0}}{2} = -10 \rightarrow \text{poles, critically damped}$$

$$\mathcal{L}^{-1}(T(s)) = e^{-10t} - 5te^{-10t}$$

General:

$$e^{-10t} - Ate^{-10t}$$