

$$1 a) \frac{d^2 y(t)}{dt^2} + 6 \frac{dy(t)}{dt} + 2 y(t) = 5 \frac{dx(t)}{dt} - 3 x(t)$$

$$\hookrightarrow \lambda^2 + 6\lambda + 2 = 0$$

$$b) \quad r_1 = -0,3542; \quad r_2 = -5,6457$$

$$c) \quad C_1 e^{-0,3542t} + C_2 e^{-5,6457t} = 10$$

$$-0,3542 C_1 e^{-0,3542t} - 5,6457 C_2 e^{-5,6457t} = 6 \quad ; \quad t > 0^+$$

$$\begin{cases} C_1 + C_2 = 10 \\ -0,3542 C_1 - 5,6457 C_2 = 6 \end{cases}$$

$$\boxed{C_1 = 10 - C_2}$$

$$-0,3542 \cdot (10 - C_2) - 5,6457 C_2 = 6$$

$$-3,542 + 0,3542 C_2 - 5,6457 C_2 = 6$$

$$-C_2 (5,2915) = 9,542$$

$$C_2 = \frac{-9,542}{5,2915} = \boxed{-1,8032} \rightarrow C_1 = 10 + 1,8032 = \boxed{11,8032}$$

$$\boxed{y_m = 11,8032 e^{-0,3542t} - 1,8032 e^{-5,6457t} \quad ; \quad t > 0^+}$$