Ex 1

G

Auto TD 2

1/ $K = 2$

$T = 10\,s$

$\omega_c = \frac{1}{10}$

Poles: $p = \frac{-1}{10}$

2/ $Y(s) = \frac{1}{s} \cdot \frac{2}{1+10s}$ (1)

$= \frac{A}{s} + \frac{B}{\frac{1}{10}+s}$

$A = \lim_{s \to 0} \frac{2/10}{\frac{1}{10}+s} = 2$

$B = \lim_{s \to -\frac{1}{10}} \frac{2}{s} = -2$

$Y(s) = \frac{2}{s} - \frac{2}{\frac{1}{10}+s}$

$y(t) = 2\Gamma(t) - 2e^{-0.1t}\Gamma(t)$

$= 2\Gamma(t)(1 - e^{-0.1t})$

$y(0) = 0$

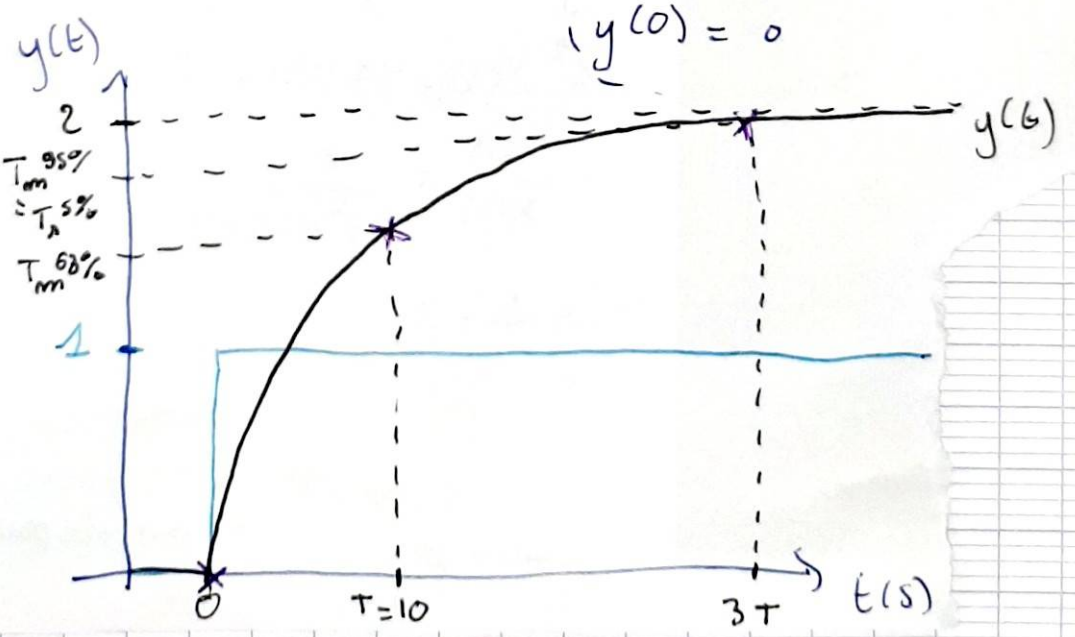
3/ $T_m^{63\%} = T$

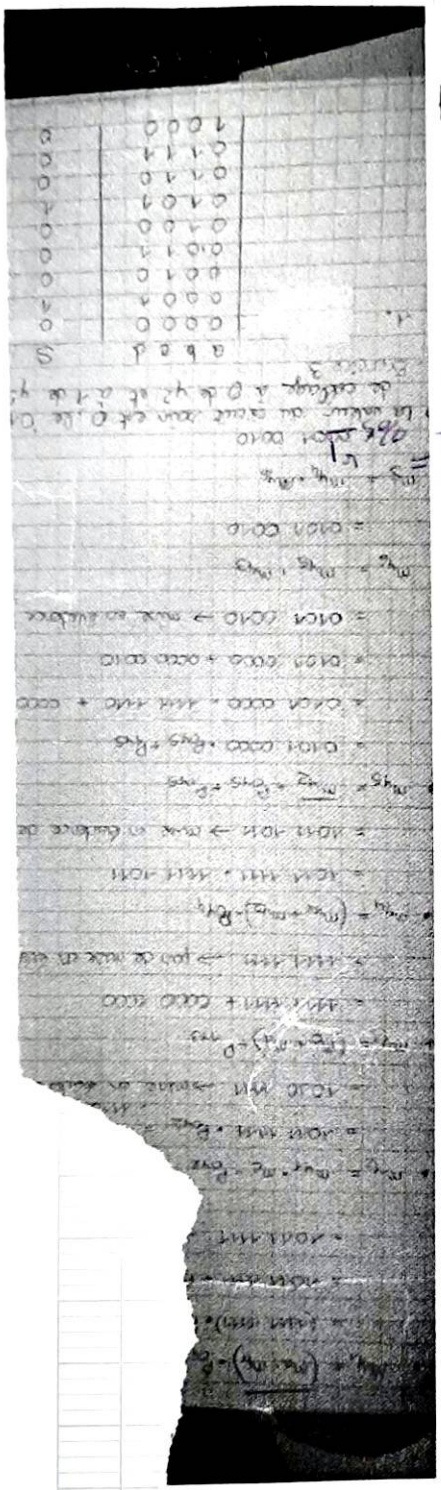
$= 10\,s$

$T_m^{95\%} = T_r^{5\%} = 3T$

$= 30\,s$

4/

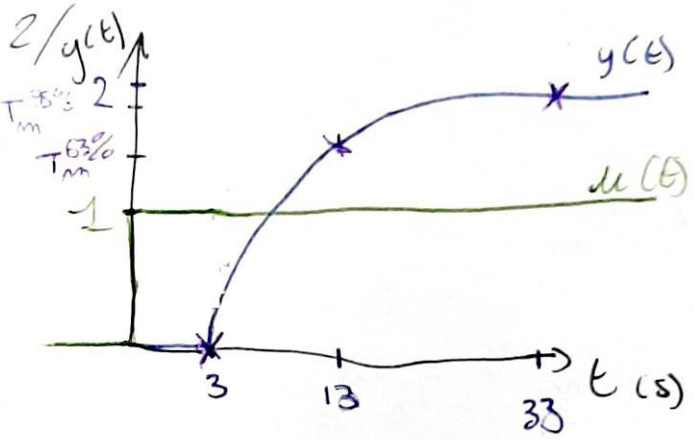




Ex 2

1/ $\dfrac{2.e^{-3s}}{1+10s}$

2/



Ex 3

1/ $\ddot{y}(t) + 4\dot{y}(t) + 8y(t) = 2x(t)$

$s^2 Y(s) + 4sY(s) + 8Y(s) = 2X(s)$

$\dfrac{Y(s)}{X(s)} = \dfrac{2}{s^2+4s+8} = G(s)$

$\begin{cases} ax^2+bx+c=0 \\ a=1 \\ b=4 \\ c=8 \end{cases}$ $\Delta = b^2 - 4ac = -16$

$p_1 = \dfrac{-b - j\sqrt{|\Delta|}}{2a} = -2-2j$

$p_2 = -2+2j$

2/ ordre : 2

$k = 1/4$

$\zeta = \dfrac{\sqrt{2}}{2}$

$\omega_0^2 = 8\ (rad.s^{-1})^2$

zeros : $\emptyset$

Poles : p_1 et p_2.

3/ pseudo periodique

Auto TD2 ②

4/ $D_1\% = e^{\frac{-\pi\xi}{\sqrt{1-\xi^2}}} \cdot 100$

$= 4,32$

$D_2\% = -(-D_1)^2 \cdot 100$

$= 0,187$

$y(T_{D_1}) = 0,2608$

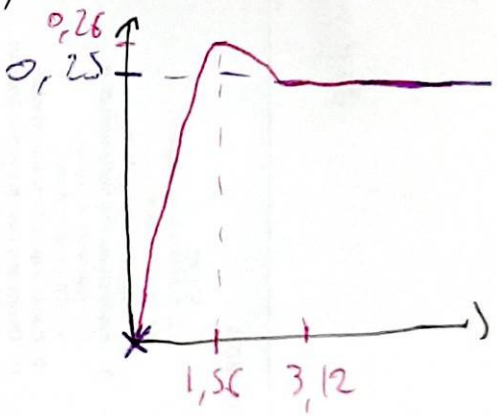
$T_{D_1} = \frac{\pi}{\omega_0\sqrt{1-\xi^2}}$

$= 1,56\ s$

$T_{D_2} = 2 \cdot T_{D_1}$

$= 3,12\ s$

5/



Ex 4

$K \simeq 0,8$

$\tau \simeq 0,2$ min

$T \simeq 0,2$ min

$G(s) = \frac{0,8 \cdot e^{-0,2s}}{1+0,2s}$

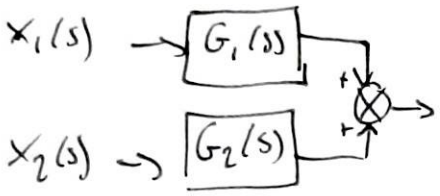
$\hookrightarrow y(t) = 0,8 \cdot \Gamma(t-0,2)$

Ajro TD2 (3)

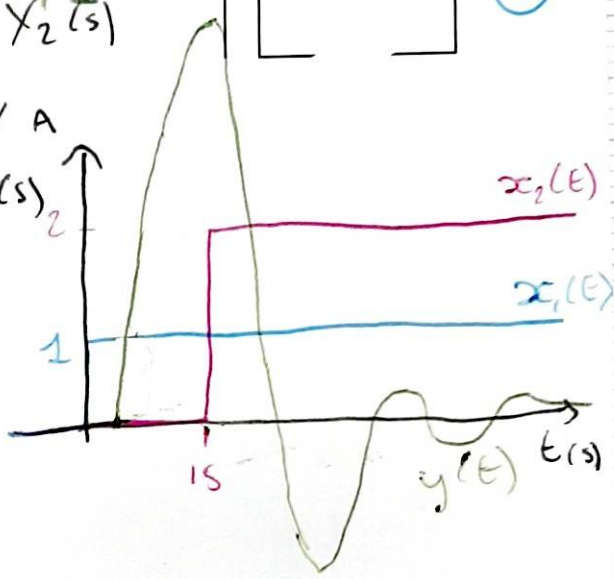
Ex5

$Y(s) = G_1(s) \cdot X_1(s) + G_2(s) \cdot X_2(s)$

1/



2/



$x_1(t) = \Gamma(t)$

$x_2(t) = 2\Gamma(t-1s)$

3/ $G_1(s) = \dfrac{K e^{-\tau s}}{1 + T s}$

4/ $K = 4$; $\tau = 2{,}5\,s$; $T = 2{,}5\,s$

5/ $G_2(s) = \dfrac{K \omega_0^2}{s^2 + 2\zeta\omega_0 s + \omega_0^2}$

$K = -2$; $y(t_{D_1}) = -2$; $D_1 = 0{,}5$; $\zeta = 0{,}21$

$t_{D_1} = 2{,}5\,s$; $\omega_0 = 1{,}28\ rad.s^{-1}$

Ex6

G_1 : X

G_2 : A (avec $\zeta = \frac{1}{2}$ et pas 0,2 comme G_6)

G_3 : E (avec $\zeta < 0$ syst. instable)

G_4 : X

G_5 : D avec $T = 1\,s$ (et pas 10 s comme $G_1(s)$)

G_6 : B (car dernier $K = 1$)

G_7 : C (avec $K = 2/3$)