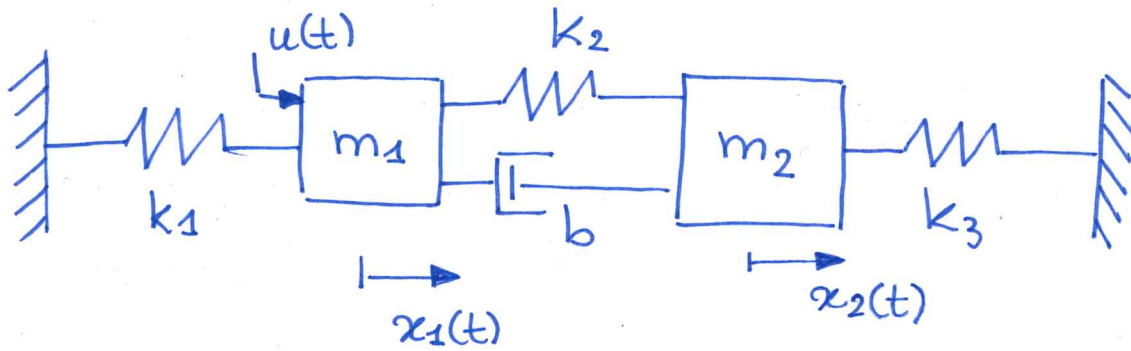


EX. 1

HOMEWORK 1

GIVEN THE MECHANICAL SYSTEM:



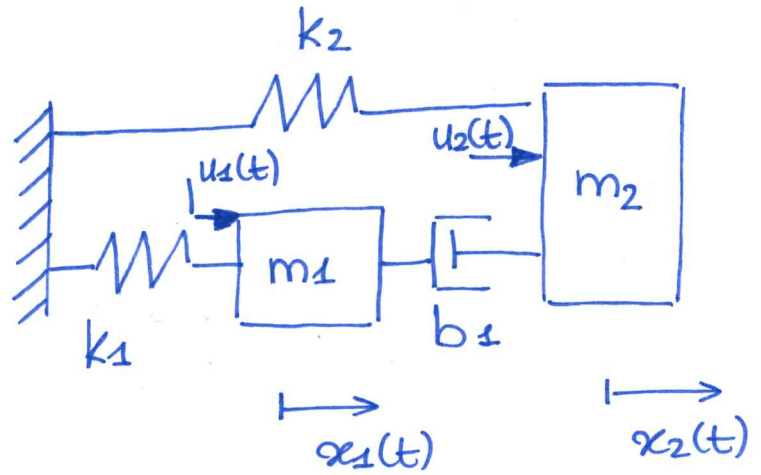
FIND THE TRANSFER FUNCTIONS: $\frac{X_1(s)}{U(s)}$ AND $\frac{X_2(s)}{U(s)}$

EX. 2

OBTAIN A STATE-SPACE REPRESENTATION OF THE MECHANICAL SYSTEM, WHERE:

- u_1 AND u_2 ARE THE INPUTS
- x_1 AND x_2 ARE THE OUTPUTS

(2 INPUTS AND 2 OUTPUTS)



EX. 3

GIVEN THE SYSTEM:

$$G(s) = \frac{C(s)}{R(s)} = \frac{100}{s^2 + 3s + 25}$$

- 1) REPRESENT THE TRANSFER FUNCTION IN STATE SPACE;
- 2) MAKE A ROUGH PLOT OF $c(t)$ IF $r(t)$ IS A UNIT STEP;
- 3) FIND $c(t)$ AT STEADY STATE, THE NATURAL FREQUENCY ω_n , THE DAMPING RATIO ζ , THE SETTLING TIME T_s , AND THE PERCENTAGE OF OVERSHOOT % OS.