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2nd year LMD (Auto+ELT)
Module: Signal Theory

Tutorials No 03

Exercise 1

Calculate the Laplace transforms of the following time functions:

1. $x(t) = e^{-\alpha t}$; α is constant > 0 ,
2. Deduce the LT from $\cos(wt)$.
3. $f(t) = \begin{cases} A & 0 \le t \le T \\ 0 & if \quad not \end{cases}$
4. Deduce the LT from $y(t) = \begin{cases} Ae^{-\alpha t} & 0 \le t \le T \\ 0 & if \quad not \end{cases}$.
5. $x(t) = e^{0.5t} u(t-2)$.
6. $x(t) = te^{-\alpha t} \delta(t-1)$
7. Use the properties to infer the LT of $t^5 e^{2t}$.

Exercise 2

Calculate the inverse Laplace transforms of the following functions:

1. $F_1(p) = \dfrac{2}{p(p+2)(p-3)}$
2. $F_2(p) = \dfrac{2}{(p+1)^3 (p+2)}$
3. $F_3(p) = \dfrac{p(p+2)}{p^2 + 2p + 2}$

Exercise 3

Using the initial and final value theorems, calculate $s(t \to 0+)$ and $s(t \to \infty)$ for the following functions:

1. $S_1(p) = \dfrac{p^2 + 2p + 4}{p^3 + 3p^2 + 2p}$
2. $S_2(p) = \dfrac{p^3 + 2p^2 + 6p + 8}{p^3 + 4p}$