



Answer 4 only of the following questions

1- Evaluate the following integrals

$$\int_0^2 \frac{t^2 dt}{\sqrt{2-t}} \quad \int_0^{\infty} \frac{t^2 dt}{1+t^4} \quad \int_0^{\infty} t^n e^{-mt} dt \quad \int_0^1 t^{q/p-1} (1-t^q)^{-1/p} dt$$

2- Find F(s) of the following functions:

$$\text{a) } f(t) = \begin{cases} 2 & 0 < t \leq 2 \\ 3t & 2 < t \leq 3 \\ t^2 & t > 3 \end{cases} \quad \text{b) } g(t) = \sin^2 4t + \cos 2t \cosh 5t + \frac{e^{2t} - e^{-3t}}{t}$$

3- Find inverse Laplace of the following functions

$$\text{a) } F(s) = \frac{s}{s^2 + 4s + 9}, \quad \text{b) } F(s) = \frac{e^{-2s}}{s+3}, \quad \text{c) } F(s) = \frac{1}{(s+9)^3},$$

4- Solve the following differential equation using Laplace:

$$y'' - 3y' + 2y = 8e^{2t}, \quad y(0) = y'(0) = 3$$

5- $f(x) = \cos x$, $-\pi < x < \pi$, then deduce the sum

$$\frac{1}{1 \cdot 3} + \frac{1}{3 \cdot 5} + \frac{1}{5 \cdot 7} + \dots$$

$$\text{6- } y' = \frac{y+1}{x}, \quad y=3 \text{ at } x=2, \text{ find } y(2.8), h=0.2$$

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