

Department of Mathematical Science
Indian Institute of Technology (BHU), Vranasi-221005
Mathematical Method: MA-203
Tutorial Sheet-1

Note: Based on Laplace transform.

1. Evaluate the Laplace transform of each function directly from the defining integral.
 - (i) $f(t) = \cos^2 kt$
 - (ii) $f(t) = e^{at} \cosh(kt)$
 - (iii) $f(t) = t \sin(kt)$
2. If $L[f(t)] = \frac{e^{-1/s}}{s}$, then show that $L[e^{-t} f(4t)] = \frac{e^{-4/(s+1)}}{s+1}$.
3. Evaluate $\int_0^\infty t^3 e^{-t} \sin t \, dt$.
4. Find the Laplace transform of $f(t)$, where

$$f(t) = \begin{cases} \cos t, & 0 < t < \pi \\ \cos 2t, & \pi < t < 2\pi \\ \cos 3t, & t > 2\pi \end{cases}$$

expressing it in terms of unit step function.

5. Find Laplace transform of a periodic function $f(t)$ of period $2c$ given by

$$f(t) = \begin{cases} t, & 0 < t < c \\ 2c - t, & c < t < 2c. \end{cases}$$
