The University of Zambia
Department of Mathematics and Statistics
Mat 3110-Engineering Mathematics II

Assignment 2- Submit by 20th July, 2020.

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1. Find the Laplace transforms of the following functions. Assume that ω and θ are constants.
   (a) $\cos^2 \omega t$ (b) $\sin(\omega t + \theta)$ (c) $\sinh t \cos t$

2. Find the inverse Laplace transforms of the following functions.
   (a) $\frac{12}{s^4} - \frac{228}{s^6}$ (b) $\frac{6}{(s+1)^3}$ (c) $\frac{\pi}{s^2+10\pi s+24\pi^2}$

3. Solve the following initial value problems by using Laplace transforms.
   (a) $y'' - 4y' + 3y = 6t - 8, \quad y(0) = 0,\ y'(0) = 0$
   (b) $y''+2y'+5y = 10t-100,\ y(2) = -4,\ y'(2) = 14$
   (c) $y'' + 9y = \begin{cases} 8\sin t, & : 0 < t < \pi \\ 0, & : t \geq \pi \end{cases} \quad y(0) = 0,\ y'(0) = 4$