MT232: Differential Equations

Worksheet 13

Fri Dec 07, 2018

Fall 2018

Student 1 Roll No._____ **Evaluator 1 Roll No.**_____

Student 2 Roll No._____ **Evaluator 2 Roll No.**_____

Problem 1 (30 Marks)

Determine for which of the following functions the Laplace transform exists.
Hint: Functions having Laplace transform are of "exponential type"

(a) $f(t) = \sin t + \cos 2t$

(b) $f(t) = 1 + t^4$

(c) $f(t) = \dfrac{\sin t}{t^2}$

Problem 2 (70 Marks)

Use Laplace transform to solve the given initial-value problems

(i) $y' + 3y = 2$ $\quad y(0) = 6$

(ii) $y'' + 3y' + 2y = e^{-4t}$ $\quad y(0) = 0, y'(0) = 0$

(iii) $y'' - 5y' - 6y = \sin 3t$ $\quad y(0) = 0, y'(0) = 0$

(iv) $2y' + y = h(t)$ $\quad y(0) = -3$

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

(vi) $y'' - 2y' + 5y = \delta(t)$ $\quad y(0) = 0, y'(0) = 0$

(vii) $y'' - 4y' + 4y = 4$ $\quad y(0) = 0, y'(0) = 0$