

**Worksheet #9****Date :** 27/03/2024**Name:** \_\_\_\_\_**MTH204:** ODEs/PDEs**Semester:** Winter 2024**Section:** \_\_\_\_\_

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**Problem 1.** Find the Laplace transform of the following functions:

(a)  $\cos^2 \omega t$

(b)  $t^2 e^{-3t}$

(c)  $t \cos 4t$

**Problem 2.** Find the inverse Laplace transform of the following functions:

(a)  $\frac{5s + 1}{s^2 - 25}$

(b)  $\frac{21}{(s + \sqrt{2})^4}$

(c)  $\frac{20}{s^3 - 2\pi s^2}$

**Problem 3.** Solve the Initial Value Problem

$$y'' - y' - 6y = 0 \quad y(0) = 11 \quad y'(0) = 28.$$

**Problem 4.** Solve the Initial Value Problem

$$y'' + 3y' - 4y = 6e^{2t-3} \quad y(1.5) = 4 \quad y'(1.5) = 5.$$

**Problem 5.** Solve the Initial Value Problem

$$y'' + 6y' + 8y = e^{-3t} - e^{-5t} \quad y(0) = 0 \quad y'(0) = 0.$$