

**Worksheet #10****Date : 03/04/2024****MTH204: ODEs/PDEs****Semester: Winter 2024****Name:** \_\_\_\_\_**Section:** \_\_\_\_\_

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**Problem 1.** Solve the IVP

$$y'' + 5y' + 6y = \delta\left(t - \frac{\pi}{2}\right) + u(t - \pi) \cos t \quad y(0) = 0, \quad y'(0) = 0$$

**Problem 2.** Find the convolution of  $e^{at} * e^{bt}$  with  $a \neq b$ .**Problem 3.** Find the inverse Laplace transform of  $\log \frac{s+a}{s+b}$ .**Problem 4.** Solve the ODE system

$$\begin{aligned} y_1' + y_2 &= 0 \\ y_1 + y_2' &= 2 \cos t \end{aligned}$$

with  $y_1(0) = 1, \quad y_2(0) = 0$ .**Problem 5.** Find the Laplace transform of  $3t \sinh 4t$ .**Problem 6.** Solve the ODE system

$$\begin{aligned} y_1' &= -y_1 + 4y_2 \\ y_2' &= 3y_1 - 4y_2 \end{aligned}$$

with  $y_1(0) = 3, y_2(0) = 4$ .