

**Due at the beginning of class on the day of Test 3**

*Direction: Solve the problems in this worksheet on separate sheets of paper. Write your solution neatly. Use standard size paper. Clearly label each problem, and include each problem in the correct order. No ragged edges. Staple multiple pages. At the top of the first page put your name, Math 2320, and the title of the homework assignment. Show all work to justify your answer. Answer with insufficient work will receive no credit.*

**Problem 1: Find the Laplace Transform using Derivatives**

1.  $\mathcal{L}\{xe^{-10x}\}$

2.  $\mathcal{L}\{x^3e^x\}$

**Problem 2: Find the Laplace Transform using Derivatives**

1.  $\mathcal{L}\{x \cos(2x)\}$

2.  $\mathcal{L}\{x \sinh(3x)\}$

3.  $\mathcal{L}\{xe^{2x} \sin(6x)\}$

**Problem 3: Solve an IVP using Laplace transform**

Solve the IVP:  $y'' + 9y = \cos(3x)$ ,  $y(0) = 2$ ,  $y'(0) = 5$ .

(Hint: When you try to find the inverse Laplace, think about  $\mathcal{L}\{x \cos(bx)\}$ )

**Problem 4: Solve an IVP using Laplace transform**

Solve the IVP:  $y'' + y = \sin x$ ,  $y(0) = 1$ ,  $y'(0) = -1$ .

(Hint: When you try to find the inverse Laplace, think about  $\mathcal{L}\{x \sin(bx)\}$ )

**Problem 5: Solve an IVP using Laplace transform**

Solve the IVP:  $2y'' + xy' - 2y = 10$ ,  $y(0) = y'(0) = 0$