Assignment - 4b

1. Apply Laplace transform to solve

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial t} = x, \quad x > 0, t > 0$$

$$u(0,t) = 0, \quad t > 0$$

$$u(x,0) = 0, \quad x > 0.$$

2. Consider

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial t} + u = 0, \quad x > 0, t > 0$$

$$u(0,t) = 0, \quad t > 0,$$

$$u(x,0) = \sin x, \quad x > 0$$

Use Laplace transform technique to find $u(x,t)$.

3. Use Laplace transform technique to solve

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, \quad 0 < x < 2, t > 0$$

$$u(0,t) = 0 = u(2,t), \quad t > 0$$

$$u(x,0) = 3 \sin 2\pi x$$

4. Use Laplace transform technique to solve

$$\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2} + \sin \pi x, \quad 0 < x < 1, t > 0$$

$$u(x,0) = 0, \quad u(x,0) = 0$$

$$u(0,t) = 0, \quad u(1,t) = 0$$

5. Use Laplace transform techniaue to solve

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, \quad -\infty < x < \infty, t > 0$$

$$u(x,0) = f(x), \quad u(x,t) \text{ is bounded.}$$