Name:_____
Quiz 10; April 28
MATH 54 with Prof. Sethian
GSI: Alex Carney

You have 20 minutes to complete the quiz. Calculators are not permitted.

1. (4 points) Solve the following heat equation for $u(x,t)$:

$$\frac{\partial u}{\partial t} = 3\frac{\partial^2 u}{\partial x^2}, \quad 0 < x < 1, \quad t > 0$$

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

$$u(x,0) = x, \quad 0 < x < 1$$

2. (4 points) Solve the following wave equation for $u(x,t)$:

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

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

$$u(x,0) = -\sin(x), \quad 0 < x < \pi$$

$$\frac{\partial}{\partial t}u(x,0) = 3\sin(4x) - 5\sin(5x), \quad 0 < x < \pi$$

3. (4 points) Write down the

    (a) Fourier series for e^x on $-\pi < x < \pi$

    (b) Fourier sine series for e^x on $0 < x < \pi$

    (c) Fourier cosine series for e^x on $0 < x < \pi$.

Note: You may express the coefficients as integrals, and do not need to solve these integrals.