

Fall 2008 - Math 462 Section 0101
Partial Differential Equations for Scientists and Engineers
Homework #10 - Due Tuesday Nov 18th

1. (30pt) Determine whether the method of separation of variables can be used to replace the following PDE's by a pair of ODE's. If so, find the equations:

(a) $xu_{xx} + tu_t = 0$

(b) $u_{xx} + u_{yy} = x$

(c) $u_x + u_{xt} + u_t = 0$

2. (40pt) Let $\phi(x) = x^2$ for $0 \leq x \leq 1$.

(a) Calculate its Fourier sine series

(b) Calculate its Fourier cosine series

3. (30pt) We recall that if f is an odd function, then

$$\int_{-L}^L f(x) dx = 0.$$

(a) Use this property to show that if $\phi(x)$ is an odd function, its full Fourier Series on $(-L, L)$ has only sine terms.

(b) Similarly, show that if $\phi(x)$ is an even function, its full Fourier Series on $(-L, L)$ has only cosine terms.