Math 228
2-22-1994

Problem Set 15.

Problem Set 15 is due on Friday, February 25.

1. (a) $y_1 = \sqrt{x}$ is a solution to the homogeneous equation

$$2x^2 y'' - xy' + y = 0.$$

Use reduction of order to show that $y_2 = x$ is a second independent solution. If you have trouble with the algebra, go on to part (b).

(b) Use the independent homogeneous solutions $y_1 = \sqrt{x}$ and $y_2 = x$ to solve the equation

$$2x^2 y'' - xy' + y = 2x^3.$$

Be careful to put the equation into standard form before you start! If you have trouble with the algebra, open your window and shout: "Iä! Iä! Cthulhu fhtagn!"

2. Find the general solution:

$$(D^2 + 4)y = 4\cos 2x.$$

3. In this problem, you do not have to solve the equations. In each case, say whether the method of undetermined coefficients is applicable or not. If it is applicable, say what form a particular solution y_p should have. y_p should not include any functions which are part of the general homogeneous solution.

(a) $y'' - 2y' + y = \tan x$.

(b) $y'' - 2y' + y = \cosh x$.

(c) $(D^2 - 3D - 4)y = \sqrt{x}$.

(d) $(D^2 - 9)y = \cos 3x$.

(e) $(D^2 + 9)y = \cos 3x$.

(f) $y'' - 4y' = 1 + 2x + 3x^2$.

(g) $(D^2 - 2D + 1)y = e^x(2\cos x - 3\sin x)$.