

### Physics 3513, Homework #8 (due 11/5)

The numbers in parentheses after the problem number indicate points for each problem.

P1(10) (Boas 2.5) Solve by separating variables:  $xy' - xy = y$ ,  $y(1) = 1$

P2(10) (Boas 3.8) Solve  $(x \ln x)y' + y = \ln x$

P3(10) Solve  $xy' + y \ln x = y(1 + \ln y)$  (hint: this equation is homogeneous).

P4(10) Solve  $y' = \cos(y - x)$  (hint: try  $u = y - x$ ).

P5(10) (Boas 5.12) Solve  $2y'' + y' - y = 0$

P6(10) (Boas 6.6) Solve  $y'' + 6y' + 9y = 12e^{-x}$

P7(10) (Boas 7.3) Solve  $2yy'' = y'^2$

P8(10) (Boas 9.8) Solve by using Laplace transform:  $y'' + 16y = 8 \cos 4t$ ,  $y(0) = y'(0) = 0$

P9(10) (Boas 11.10) Solve  $y'' - 9y = \delta(t - t_0)$

P10(10) Let  $y_1(x)$ ,  $y_2(x)$  be two solutions of  $y'' + p(x)y' + q(x)y = 0$ . Show that their Wronskian

$$W = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = Ce^{-\int p dx}, \text{ where } C \text{ is a constant. Hint: show that } W' = -pW.$$