Answers to DE Final Exam, Fall 2002

The average was about 59, which brought the semester average down to about 68. The lowest scores were on problem 2, and secondly on 1C. Quite a few of these problems are worked out in the text, and I will just give you a reference for those.

1A) Ex 2.12. It is not exact, but is homog, so use $y = vx$ etc.

1B) Ex 4.37 (just give the formulas for y_c (line 4) and y_p (line 2 of part 5).

1C) Ex 4.16 (start with $y = vx$, etc)

2a) The indicial equation is $r^2 = 0$ with $r_1 = r_2 = 0$.
 [You can set $n = 0$ in the series for $xy'' + y'$ and get $c_0(r + r(r-1)) = 0$, etc]

2b) Give the two formulas in Thm 6.3, Conclusion 3 [or work it out].

3) See Thms 9.8 and 9.9.

4) TFFFT

5) This is from HW problem 3.2.1, similar to Ex 3.5. You should write out a DE in x and the two initial conditions, and stop. I gave partial credit for setting it up in terms of v instead of x, but you need x to get the distance travelled.

$$x'' + 4x = 32, \quad x'(0) = 0, \quad x(0) = 0$$

6) exercise 9.5.1: Begin with $sX - 2s + Y = \frac{3}{s-2}$ and $sY + X = 0$. Algebra gives $Y = (1-2s)/[(s-2)(s-1)(s+1)] = -1/(s-2) + 1/(2(s-1)) + 1/(2(s+1))$ (from partial fractions). So, $y = -e^{2t} + 1/2e^t + 1/2e^{-t}$. Then $x = -y' = 2e^{2t} - 1/2e^t + 1/2e^{-t}$.

7) Ex 9.22

8) exercise 9.4A.3, answer in text.