Math 286(3.1-3.3) Hw 6 Name & Box number:

1. Solve the second order linear DE or IVP given below.

(a) $y''+3y'+2y=0$

(b) $4y''-y=0, \quad y(-2)=1, \ y'(-2)=-1$

2. Find the solution of the IVP $2y''-3y'+y=0, \quad y(0)=2, \ y'(0)=\frac{1}{2}$. Then determine the maximum value of the solution and also find the point where the solution is zero.

3. Solve the IVP $4y''-y=0, \quad y(0)=2, \ y'(0)=\beta$. Then find β so that the solution approaches zero as $t\to\infty$.

4. Determine the longest interval in which the given initial value problem is certain to have a unique solution. Use the theorem 3.2.1, Existence and Uniqueness Theorem.

(a) $(t-1)y''-3ty'+4y=\sin t, \ y(-2)=2, \ y'(-2)=1$

(b) $y''+(\cos t)y'+3(\ln|t|)y=0, \ y(2)=2, \ y'(2)=1$

5. Determine if the following second-order differential equations are (1) linear or non-linear, (2) homogeneous or nonhomogeneous, and (3) with constant or variable coefficients.

(a) $y''+3yy'=6x^2$ (b) $y''-3y=e^{2x}$ (c) $x^2y''+xy'+y=0$ (d) $y''+xy'-3y=\sin 2x$

6. Verify that the functions y_1 and y_2 are solutions of the given DE. Do they constitute a fundamental set of solutions?

$y''-2y'+y=0, \ y_1(t)=e^t, \ y_2(t)=te^t$