Math 286(3.3-3.5) Hw 7 Name & Box number:

1. Solve the DE or IVP given below. For IVP, sketch the graph of the solution and describe its behavior for increasing t.

(a) $y''-2y'+6y=0$

(b) $4y''+9y=0$

(c) $y''+y'+1.25y=0, \quad y(0)=3, \ y'(0)=1$

(d) $y''-2y'+5y=0, \quad y(\frac{\pi}{2})=0, \ y'(\frac{\pi}{2})=2$

(e) $y''-6y'+9y=0$

(f) $9y''-12y'+4y=0, \quad y(0)=2, \ y'(0)=-1$

(g) $t^2y''+3ty'-3y=0$, $t>0$

(h) $t^2y''+7ty'+10y=0$, $t>0$

2. Find the Wronskian of the given pair of the functions.

(a) $x, \ xe^{2x}$ (b) $e^t\sin t, \ e^t\cos t$ (c) $\cos^2\theta, \ 1+\cos 2\theta$

3. Without solving the equations find the Wronskian of two solutions of the given DE below.

(a) $t^2y''-t(t+2)y'+(t+2)y=0$

(b) $x^2y''+xy'+(x^2-v^2)y=0$ for a constant v (it is called the Bessel equation)

(c) $(1-x^2)y''-2xy'+\alpha(\alpha+1)y=0$ for a constant α (it is called the Legendre equation)

4. Use the method of reduction of order to find the second solution of the DE below.

(a) $t^2y''-t(t+2)y'+(t+2)y=0, \quad t>0; \ y_1(t)=t$

(b) $xy''-y'+4x^3y=0, \quad x>0; \ y_1(t)=\cos x^2$

5. Consider the IVP: $4y''+12y'+9y=0, \quad y(0)=1, \ y'(0)=b$. Find the value of b that separates solutions that always remain positive from those that eventually become negative.