1. Compute the Wronskian of the functions

$$y_, = e^{-x} \cos 2x \qquad y_2 = e^{-x} \sin 2x$$

a. e^{-x} b. e^{-2x} c. 0 d. $2e^{-x}$ e. $2e^{-2x}$

2. Which of the following pair of functions is linearly dependent?

a. $f(x) = 1 + 2x,\ g(x) = 1-2x$

b. $f(x) = e^{x+1},\ g(x) = e^{x-1}$

c. $f(x) = e^{x},\ g(x) = e^{-x}$

d. $f(x) = \sin x,\ g(x) = \sin^2 x$

e. $f(x) = \sin^2 x,\ g(x) = \cos^2 x$

3. Suppose y_1 and y_2 are two solutions to $y'' - 2xy' + x^2 y = 0$

Their Wronskian at 0 is equal to 1. Then the Wronskian at 1 is equal to

a. e^{1} b. e^{-1} c. e^{2} d. e^{-2} e. 0

4. The general solutions of the equation $y'' - 4y' = 0$ are

a. $y = c_1 \cos 2x + c_2 \sin 2x$ b. $y = c_1 e^{4x} + c_2 x$

c. $y = c_1 e^{4x} + c_2$ d. $y = c_1 e^{-4x} + c_2$

e. $y = c_1 e^{-4x} + c_2 x$

5. The solution of the differential equation

$$y'' + 2y' + 2y = 0 , \quad y(0) = 0 , \; y'(0) = 1$$

is

a. $y = e^{-x} \cos x$ b. $y = e^{x} \cos x$ c. $y = e^{x} \sin x$

d. $y = e^{-x} \sin x$ e. $y = e^{-x} \sin x \cos x$

6. A particular solution to $y'' - 3y' = x + 2$ should have the following form

a. $Ax + B$ b. $x\,(Ax + B)$ c. $x^2\,(A\,x + B)$ d. $e^{3x}\,(A\,x + B)$

e. $xe^{3x}\,(Ax + B)$

7. Find the general solution $y'' + 9\,y = \sin 3x$

8. Find the general solution of the differential equation

$$y'' + 4y = \sec 2x$$

9. Check that $y_1 = x$ is a solution of $x^2 y'' + 2xy' - 2y = 0 \quad (x>0)$

and find a second linearly independent solution.