DIRECTIONS   To receive full credit, you must provide complete legible solutions to the following problems in the space provided. Transfer all your answers to the space provided.

1.   Solve the differential equation by variation of parameters.
$$y'' + y = \sin(x)$$

2.   Solve the differential equation by variation of parameters
$$y'' - 16y = \frac{16x}{e^{4x}}$$

3.   Solve the given differential equation by undetermined coefficients.
$$y''' + y'' = x^2$$

3.   The indicated functions are known linearly independent solutions of the associated homogeneous differential equation on (0, 8). Find the general solution of the given nonhomogeneous equation.

$$x^2 y'' + xy' + y = sec(ln(x)); \quad y_1 = cos(ln(x)), y_2 = sin(ln(x))$$

4.   Solve the given third-order differential equation by variation of parameters.

$$y''' - 6y'' - y' + 6y = e^{3x}$$