

**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 given differential equation.  
 $xy'' - y' = 0$

2. Solve the given differential equation.  
 $3x^2y'' + 6xy' + y = 0$

3. Solve the given differential equation  
 $x^2y'' + 7xy' + 9y = 0$

4. Solve the given differential equation by variation of parameters.

$$4x^2y'' + 9xy' + y = x^2 - x$$

5. Use the substitution  $x = e^t$  to transform the given Cauchy-Euler equation to a differential equation with constant coefficients, then solve

$$x^2y'' + 7xy' - 16y = 0$$