Solve the following problems (20% for each problem):

1. $\dfrac{\partial u}{\partial x} + 2x\dfrac{\partial u}{\partial t} = 2x$ with $u(x,0) = 1 \; ; u(0,t) = t$

2. $y_1'' = y_1 +$
   $y_2'' = 2y_1 +$

3. $(D^2 - 2D + I)y = x^2 + x^-$

4. $4xy'' + 2y' + y$

5. $y(3x^2 - ay)dx - x(3x^2 - 2ay)dy$