Linear Homogeneous Equations

1. Show the following pairs of functions are linearly independent. Note that while it is reasonably easy to show linear independence directly from the definition, it is probably easier to check the Wronskian.

   a. $e^{rx}$ and $e^{sx}$ for all choices of $r \neq s$.

   b. $e^{rx}$ and $xe^{rx}$ for all choices of $r$.

2. Find the general solution to $y'' + (x + 1)y' + (x + 1)y = 0$.
   
   Hint: This equation is factored on the bottom of p. 81 of the text. Use this factoring and the substitution $u = (D + x)y$ to reduce the equation to a first order equation in $u$, solve for $u$, and then solve a first order linear equation for $y$ once you have the formula for $u$. 