MAP 2302: Homework - Due Monday, July 8, 2019 **Name:** ____________

1. Consider the 2nd order, linear homogeneous DE

$$(x-1)y'' - xy' + y = 0\ .$$

(a) Check that $y_1(x) = x$ is a solution for the DE.

(b) Use the recipe from Theorem 4.6 (or 4.7) from section 4.1 C to reduce the order and find a second solution $y_2(x)$ for the DE. The recipe is to do the substitution $y = y_1(x) \cdot v$ (in this case, $y = xv$), followed by another substitution $w = v'$, to get a 1st order linear ODE.

(c) Write the general solution of the DE.

(d) Find the solution of the DE that also satisfies the initial condition $y(0) = 3$.

2. Find the general solution of the DE

$y''' - 5y'' + 7y' - 3y = 0$

3. Given that

$$m^4 + 6m^3 + 11m^2 + 6m + 1 = (m^2 + 3m + 1)^2$$

find the general solution of the DE

$y^{(4)} + 6y^{(3)} + 11y^{(2)} + 6y' + y = 0$