MAP 2302, Exam I, Fall 2015

Name:_____

Student signature:_____

Turn in all relevant work with final answers circled on separate sheets. Full work is required for full credit.

(1) Find a differential equation of the form $\frac{dy}{dx} = G(y)$ so that $y = \tan(x)$ is a solution.

(2) Apply the transformation $u = xy$ to the differential equation

$$\frac{dy}{dx} = \frac{e^{xy} - xy}{x^2}.$$

Use this to solve the DE.

(3) Solve the IVP

$$\frac{e^x}{y^2+1}dy - xdx = 0 \;\; y(0) = 0.$$

(4) Find the most general family of solutions to the differential equation

$$x\frac{dy}{dx} - (1+x)y = xy^2$$

(5) Find an integrating factor of the form $x^n y^m$ to the ODE

$$(12 + 5xy)dx + (6xy^{-1} + 3x^2)dy = 0.$$

Use this to find a family of solutions to the ODE.