MAP 2302 (Differential Equations)
TEST 1, Friday February 9, 2018

Name: **PID:**

Remember that no documents or calculators are allowed during the test. You must show all your work to deserve the full credit assigned to any question. Guessed answers won't give you any credits. You may use the back of each sheet as scratch. 4 pages. Total =90 points including 10 bonus points.

1. [20] Solve the the initial-value problem:

$$\begin{cases} (1 + \cos x)\dfrac{dy}{dx} - (\sin x)y = \sec^2 x \\ y(0) = 2. \end{cases}$$

2. [20] a) Reduce the equation $(2x - 3y + 7)dx + (x + y + 1)dy = 0$ to a homogeneous equation. Do not solve the homogeneous equation obtained.

b) Find all values of p such that $f(x) = e^{px}$ solves the differential equation: $y''' + y'' - 3y' - 3y = 0$. Do not solve the differential equation.

3. [20] Find the orthogonal trajectories to the family of curves $y = cx^4$.

4. [30] a) Show that the differential equation $3(x^2 + y^2)dx + 2xydy = 0$ is not exact. b) Find an integrating factor for this equation. c) Write down the new equation and solve it.