MATH 320, Spring 2013, Assignment 1

Due date: Friday, February 1

Name (printed): _____

UW Student ID Number: _____

Discussion Section: (circle)

Robin Prakash:	**301**	**302**	**303**	
Sowmya Acharya:	**304**	**306**	**307**	**308**
Raghvendra Chaubey:	**352**	**353**	**354**	**355**

Instructions

1. Fill out this cover page **completely** and affix it to the front of your submitted assignment.
2. **Staple** your assignment together and answer the questions in the order they appear on the assignment sheet.
3. Show all the work required to obtain your answers.
4. You are encouraged to collaborate on assignment problems but you must write up your assignment independently. **Copying is strictly forbidden!**

S#	Q#	Mark
1.1	9	/1
1.1	12	/3
1.1	25	/3
1.1	34	/1
1.2	18	/3
—	1	/4
—	2	/6
—	3	/4
Total:		/25

Classification of DEs, Solutions, Integrals

Suggested problems:

Section 1.1, 1-26, 37-48
Section 1.2, 1-22, 24-35

Problems for submission:

Section 1.1: 9, 12, 25, 34
Section 1.2: 18

1. Classify the following differential equations according to their order and whether they are linear / non-linear, autonomous / non-autonomous, and homogeneous / non-homogeneous.
   (a) $y'' - 2y' + y = 0$
   (b) $y' - \left(\dfrac{x}{1+\tan^2(x)}\right) y = 0$
   (c) $y^{(4)} + xy'' = e^{2x}$
   (d) $y \cdot y' = 1$

2. Find a function $y(x)$ satisfying the given differential equation and initial condition.
   (a) $y' = -\sin(x)e^{2x}, \quad y(0) = 1$
   [**Hint:** Consider integration by parts!]
   (b) $y' = \dfrac{5}{3x^2 - 7x + 2}, \quad y(3) = 0$
   [**Hint:** Consider partial fractions!]

3. Let's track the position of a particle with the variable y. Suppose the particle is accelerating at a rate of te^{-5t}.
   (a) Suppose the particle's initial position and initial velocity (i.e. at $t = 0$) are both zero. Formulate the relevant differential equation and initial conditions (i.e. turn this into a math problem, not a word problem!).
   (b) Solve the intial value problem derived in part (a).
   (c) Does the particle ever return to its original position? Does it ever reverse direction? Justify your answers.