

MATH 3113

Midterm I

October 3, 2008

Name :

I.D. no. :

- Calculators are not allowed. The problems are set so that you should not need calculators at all.
- Show as much work as possible. Answers without explanation will not receive any credit.
- Best of Luck.

i) (20 Points) Solve the following initial value problem

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

ii) (20 Points) Verify that the following differential equation is exact and then solve it.

$$(4xy + 1)dx + (2x^2 + \cos(y))dy = 0$$

iii) (20 Points) A ball is thrown straight downward from the top of a tall building. The initial speed is 15 miles per hour. It strikes the ground with the speed of 111 miles per hour. How tall is the building ?

iv) (20 Points) Find the general solution of

$$y^{(3)} - 2y'' - 9y' + 18y = 0.$$

v) (20 Points) Find a particular solution to the differential equation

$$y'' + y = 1 + \tan(x).$$

(If necessary, you can use the formula $\int \sec(x)dx = \ln |\sec(x) + \tan(x)|$)