

NAME

MATH 227 DIFFERENTIAL EQUATIONS

Test 1E

4 Problems- 25 points each

Show all work for full credit!

- 1 An airplane takes off on a runway that is 1.5 kilometers long. The plane starts off with an initial velocity of 25 meters/sec and moves with constant acceleration for 20 seconds and then lifts off the end of the runway. How fast was the plane traveling (in meters/sec) on lift off? Model and solve using differential equations. Show all differential equations and all work.
- 2 Find the general solution (implicit if necessary, explicit if convenient) for the following:

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

- 3 Verify that the differential equation is exact, then solve it.

$$(3x^2y + 4y^2 + 2)dx + (x^3 + 8yx)dy = 0$$

- 4 Use the integrating factor explained on page 47 to solve the following:

$$Cy' - Ae^{-2bx}y = Be^{-2bx}$$

where  $a, b, A, B, C$  are constants. Solve the differential equation.