

NAME

MATH 227 DIFFERENTIAL EQUATIONS

Test 1G

4 Problems- 25 points each

Show all work for full credit!

- 1 An airplane takes off on a runway that is 2 kilometers long. The plane starts off with an initial velocity of 5 meters/sec and moves with acceleration  $a(t) = a_0 + .1 * t^{0.75}$  where  $a_0$  is a constant for 45 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:

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

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

$$(6x - y)dx = (4y - x)dy$$

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

$$Cy' - Ay = B + be^{-2ax}$$

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