MATH 152 Practice Test 2 **Name:**
Student number:

Show all work. Part A. Problems 1-5, 6 points each.

1. Find the critical points of $f(x, y) = 9xy - x^3 - y^3 - 6$.

2. Use the Lagrange multiplier method to set up the system of equations(but do not solve them) for Maximizing the function $f(x, y, z) = xyz^2$ subject to the constraint $x + y + z = 6$

3. Evaluate $\int\int \sqrt{x + y} dy dx$

4. Find the general solution for $\frac{dy}{dx} = \frac{e^x}{e^y}$

5. Find the general solution for $\frac{dy}{dx} = 3xy - 2$

PartB 6-12 10 Points each

6. Find the critical point(s) of $f(x,y) = 3x^2 - 4xy = 3y^2 + 8x - 17y + 30$ and determine if the are max(s), min(s) or saddle point(s)

7. Maximize the function $f(x,y) = 4xy^2$ subject to $3x - 2y = 5$.

8. Evaluate dz if $z = x^2 + 3xy + y^2$, $x = 2$,$y = -1$, $dx = .02$ and $dy = -.01$.

9. Evaluate $\int_1^3 \int_1^2 \frac{dydx}{xy}$

10. A fish population is limited to 5000 by the food available. If there are 150 fish now and they are growing at a rate of 1% a year the equation $\frac{dy}{dx} = .01(5000 - y)$ models this population. Find the expected population at the end of 5 years.

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12. Solve the differential equation subject to the initial condition.

$$\frac{dy}{dx} + y = 2e^x; \;\; y(0) = 100$$