Math 126 - Spring 2018
Exam 2
May 17, 2018

Name: _____

Section: _____

Student ID Number: _____

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- There are 4 pages of questions. Make sure your exam contains all these questions.
- You are allowed to use a Ti-30x IIS Calculator model ONLY (**no other calculators allowed**). And you are allowed one **hand-written** 8.5 by 11 inch page of notes (front and back).
- You must show your work on all problems. The correct answer with no supporting work may result in no credit. **Put a box around your FINAL ANSWER for each problem and cross out any work that you don't want to be graded.** Give exact answers wherever possible.
- Leave your answer in exact form. Simplify standard trig, inverse trig, natural logarithm, and root values. For example, don't leave your answer in the form $\sqrt{4}$ or $\cos(\pi/4)$ or $\frac{7}{2} - \frac{3}{5}$ instead write $\sqrt{4} = 2$ and $\cos(\pi/4) = \sqrt{2}/2$ and $\frac{7}{2} - \frac{3}{5} = \frac{29}{10}$.
- There may be multiple versions of the test. Cheating will not be tolerated. We report all suspicions of cheating to the misconduct board. If you are found guilty of cheating by the misconduct board, then you will get a zero on the exam (and likely face other academic penalties). Keep your eyes on your exam!
- You have 50 minutes to complete the exam. Use your time effectively, spend less than 10 minutes on each page and make sure to leave plenty of time to look at every page. Leave nothing blank, show me what you know!

GOOD LUCK!

1. (12 pts) **The two parts below are not related.**

(a) Give the equation for the tangent plane to $f(x,y) = \dfrac{e^{5y}x^3}{1+8y}$ at $(x,y) = (2,0)$

(b) Find $\dfrac{\partial z}{\partial x}$ at the point $(x,y,z) = (1,0,2)$ for the surface implicitly defined by

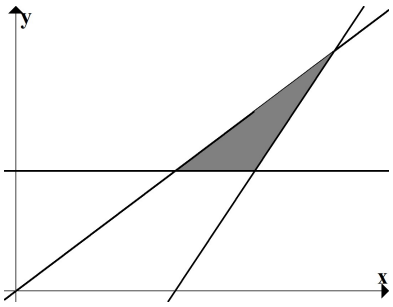
$$4xz - z^3 = \sin(\pi x + 3y) + 5\ln(1+y).$$

2. (10 pts) Find and classify all critical point(s) for $z = f(x, y) = x^3 - x^2y + y^2 - 2y$.
Clearly label whether each critical point, (x, y), gives a local max, local min or saddle point.
Show all appropriate steps of the second derivative test.

3. (14 pts) **The two parts below are not related.**

(a) Find the absolute maximum and minimum of $f(x, y) = 3y - xy$ over the region bounded by $y = x^2$, $y = 0$, and $x = 4$.

(b) Let D be the region in the xy-plane bounded by $y = 2x$, $y = 4x - 2$ and $y = 1$ (shown below). Set up the integral $\iint_D g(x, y)dA$ in BOTH ways $dxdy$ and $dydx$. Do NOT evaluate. (Note: One way will require you to split up into two regions).



4. (14 pts) **For both parts below, draw the regions of integration!**

   (a) Find the volume of the solid below the plane $z = 10$, above the paraboloid $z = 6 - 3x^2 - 3y^2$, and enclosed by the planes $x = 0$, $y = 2$ and $y = 2x$.

   (b) Rewrite the following double integral in polar coordinates, then evaluate: $\int_0^{\sqrt{2}} \int_y^{\sqrt{4-y^2}} x^2 dx dy$.