MATH 126 F
Exam II
Autumn 2018

Name _____

Student ID #_____ Section _____

HONOR STATEMENT

"I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam."

SIGNATURE:_____

- Your exam should consist of this cover sheet, followed by 6 problems on 4 pages. Check that you have a complete exam and write your name at the top of each page.
- Pace yourself. You have 50 minutes to complete the exam and there are 4 pages. Try not to spend more than about 12 minutes on each page.
- Unless otherwise indicated, **show all your work and justify your answers**.
- Unless otherwise indicated, your answers should be exact values rather than decimal approximations. (For example, $\frac{\pi}{4}$ is an exact answer and is preferable to its decimal approximation 0.7854.)
- You may use a **TI 30XII S** calculator and one 8.5×11-inch sheet of handwritten notes. **All other calculators, electronic devices, and sources are forbidden**.
- **Do not write within one centimeter of the edge of the page.** Your exam will be scanned for grading.
- If you need more room, use the back of the last page. If you need more room than that, ask your TA for extra paper, put your name on it, and **tell the grader where to look for your solution**.
- The use of headphones or earbuds during the exam is not permitted.
- There are multiple versions of the exam, you have signed an honor statement, and cheating is a hassle for everyone involved. DO NOT CHEAT.
- You are not allowed to use your phone for any reason during this exam. **Turn your phone off and put it away for the duration of the exam**.

GOOD LUCK!

1. (8 points) Consider the surface defined by the equation

$$4x^2 - 2xy + y^2z - y^3 = 44.$$

(a) Compute $\dfrac{\partial z}{\partial x}$ and $\dfrac{\partial z}{\partial y}$.

(b) Find the equation of the plane tangent to the surface at the point $(3, 4, 6)$.

2. (12 points) Consider the function $f(x, y) = x^3 - 2xy + 2y^2$.

   Find the absolute maximum and minimum values of $f(x, y)$ on the set

   $$R = \{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq 1\}.$$

   Show all work and place your final answers in the answer blanks below.

ANSWER: absolute max = _____

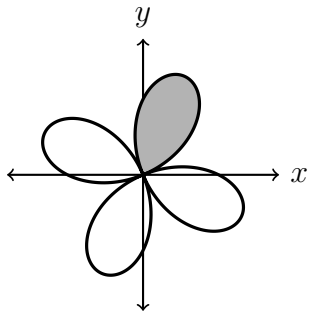
absolute min = _____

3. (8 points) Let V be the volume under the plane $8x + 2y - z = 0$ and above the region in the xy-plane enclosed by the lines $y = x$, $y = 2x$, and $y = 2$. Fill in the boxes below to give the iterated integrals one would need to evaluate in order to find the value of V.

$$V = \int_{\square}^{\square} \int_{\square}^{\square} \square \; d\square \, d\square$$

YOU DO NOT NEED TO COMPUTE THE VOLUME.
JUST FILL IN THE BOXES.

4. (6 points) A lamina is in the shape of the shaded leaf of the rose $r = \sin(2\theta) - \cos(2\theta)$, shown below. The density of the lamina at the point (x, y) is three times its distance from the origin. Fill in the boxes below to give the iterated integrals one would need to evaluate in order to find the mass m of the lamina.



$$m = \int_{\square}^{\square} \int_{\square}^{\square} \square \; dr \, d\theta$$

YOU DO NOT NEED TO COMPUTE THE MASS.
JUST FILL IN THE BOXES.

5. (8 points) Evaluate the integral by reversing the order of integration:

$$\int_0^9 \int_{\sqrt{x}}^3 \cos(\pi y^3)\, dy\, dx.$$

6. (8 points) Evaluate

$$\iint_D 6y\, dA,$$

where D is the region in the first quadrant of the xy-plane inside the circle $x^2 + y^2 = 4x$ and outside the circle $x^2 + y^2 = 4$.