MATH 126 D, E, & F

Exam II

Autumn 2017

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:______________________________

1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- Your exam should consist of this cover sheet, followed by 5 problems. Check that you have a complete exam.
- Pace yourself. You have 50 minutes to complete the exam and there are 5 pages. Try not to spend more than 10 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**.
- **You are not allowed to use scratch paper**. If you need more room, use the back of the page and indicate to the reader that you have done so.
- 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. (10 points) Find the equation of the **normal plane** to the curve $\mathbf{r}(t) = \langle 3t^2, -t^3, 2t \rangle$ at $t = 2$.

   Simplify your answer so that it is the form $z = Ax + By + C$ and put a box around your final answer.

2. (10 points) Find the shortest distance from the cone $z = \sqrt{x^2 + y^2}$ to the point $(3, -2, 0)$.

   (For full credit, you must show work and/or write a few sentences to explain how you know this distance is the minimum.)

3. (10 points) Consider the surface S defined by the equation

$$e^z + y^2 z + xy = 4.$$

(a) Use implicit differentiation to compute $\dfrac{\partial z}{\partial x}$ and $\dfrac{\partial z}{\partial y}$.

(b) The point $(1, 3, 0)$ is on the surface S. Use differentials to approximate the value of k if $(1.01, 3.03, k)$ is also on S.

4. (10 points) Suppose $f(x, y)$ is a continuous function and

$$\iint_D f(x,y)\,dA = \int_0^2 \int_{x^2}^4 f(x,y)\,dy\,dx.$$

(a) Sketch and **shade** the region D.

(b) Reverse the order of integration.

5. (10 points) A lamina occupies the region in the xy-plane above the x-axis and between the polar curves

$$r = 2\cos\theta \text{ and } r = 2 + \cos\theta \quad \text{(shown below).}$$

The density of the lamina at the point (x, y) is

$$\rho(x, y) = \frac{y}{x^2 + y^2}.$$

Compute the mass of the lamina.