

Math 2130 Prelim 2 (Spring 2017)

Before the exam:

- **Do not write anything on this page.**
- Do not open the exam.
- Turn off your cell phone.
- Make sure your books, notes, and electronics are not visible during the exam.
- Do not wear headphones during the exam.

When you open your exam:

- Make sure your exam has all its pages. There are 5 pages, including the last, and 6 problems.
- If you believe there is a printing error, let me know right away.
- Write your name on the last page, and put a check in the box corresponding to your section.

(1)	_____	/3
(2)	_____	/3
(3)	_____	/3
(4)	_____	/3
(5)	_____	/3
(6)	_____	/3
Total	_____	/18

During the exam:

- Do not talk or ask questions. If you are unsure what a question is asking, demonstrate your understanding as best you can.
- Be respectful of your fellow classmates.
- You may use the bathroom during the exam, but please ask first so I can keep track of who is out of the room at any one time.
- If you finish your exam before 2:00, you may leave early: hand your exam in at the front of the room, and do not discuss the exam directly outside the classroom. If you finish after 2:00, please remain quiet and seated until 2:15.

Notes on grading:

- Draw a around your final solution to the problem.
- Show your work. Demonstrate that you know how to get the correct answer, not just make a lucky guess.
- Clearly cross out any work that is incorrect.
- Each problem is graded out of 3. Generally, we will be looking for three specific components of your solution, each worth a point.
- If you run out of room, continue your work on the back of the previous page. Make a note that you've done this, and make it clear where your work continues.

- (1) Set up (but do not evaluate) iterated integrals using spherical coordinates to compute $\int_R (z + 2y) dV$ for R the solid unit sphere.

- (2) Convert the following integral to polar coordinates (do not evaluate it):

$$\int_{x=0}^{x=1} \int_{y=-\sqrt{1-x^2}}^{y=\sqrt{1-x^2}} y \, dy \, dx.$$

- (3) Set up (but do not evaluate) an integral to compute $\int_C x^2 ds$, where C is the counterclockwise ellipse parameterized by $\vec{r}(t) = (2 \cos t, \sin t)$ for $0 \leq t \leq 2\pi$. Do not evaluate any vector operations.

- (4) Evaluate the following integral. Show every step of your work. You may leave any arithmetic expressions unevaluated.

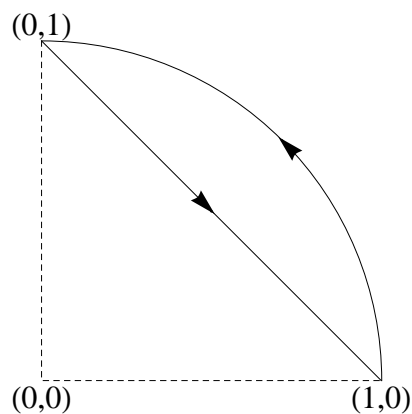
$$\int_{x=0}^{x=1} \int_{y=x^2}^{y=1} xy^3 dy dx.$$

(5) The function f satisfies the following:

$$\begin{aligned} f(1,2) &= 3 & f_x(1,2) &= 0 & f_y(1,2) &= 0 \\ f_{xx}(1,2) &= -4 & f_{xy}(1,2) &= -2 & f_{yy}(1,2) &= -3 \end{aligned}$$

What type of critical point is $(1,2)$?

(6) Set up (but do not evaluate) integrals to compute the circulation of $\vec{F} = (2-y, xy)$ around the loop shown below. The dashed lines are just for reference: do not integrate along them. The arc is a portion of the unit circle, centered at the origin. Do not evaluate any vector operations.



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Name: _____ Netid: _____

Section (check which one applies):

- Discussion 1 (9:05am-9:55am)
- Discussion 2 (10:10am-11:00am)