Math 2130 Prelim 1 (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 6 pages, including the last, and 8 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.

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 box 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.
- Partial credit will very rarely be awarded, if at all.
- 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) Do the parameterized lines \( x = t - 1, y = 2t \) for \( -\infty < t < \infty \) and \( x = t, y = t + 1 \) for \( -\infty < t < \infty \) intersect? If so, where?

(2) Sketch a contour diagram for the function \( f(x, y) = xy \). Include at least 3 contours, and be sure to label them.
(3) Find the cosine of the angle between the vectors $(1, 0, 2)$ and $(1, 1, 1)$. Your final answer should not have any vector operations in it, but does not need to be otherwise simplified.

(4) Find the area of the parallelogram formed by the points $(0, 0, 0)$, $(1, 0, 1)$, $(1, 1, 0)$, and $(2, 1, 1)$. Your final answer should not have any vector operations in it, but does not need to be otherwise simplified.
(5) Parameterize the line segment from (3, 4, 5) to (3, 3, 3). Any complete parameterization with the correct direction will do.

(6) Find a vector in the direction of the tangent line to the parameterized curve \((\cos t, \sin t, 2t)\) at the point \((1, 0, 0)\).
(7) Find the equation of the tangent plane to the graph of \( z = x^2 + 2xy \) at the point \( x = 1, y = 2 \). Any form of the equation is acceptable.

(8) Consider the function \( f(x, y) = x^y \) at the point \( x = 1, y = 1 \). In what direction is \( f \) increasing the fastest? Specifically, find a vector in this direction.
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Name: ____________________________ Netid: ____________________

Section (check which one applies):
☐ Discussion 1 (9:05am-9:55am)
☐ Discussion 2 (10:10am-11:00am)

Do not write in this box

(1) ________

(2) ________

(3) ________

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(6) ________

(7) ________

(8) ________

Total ________