Math 118, Section 39441, Fall 2018, USC Instructor: Steven Heilman

Name: _____ USC ID: _____ Date: _____

Signature: _____.
(By signing here, I certify that I have taken this test while refraining from cheating.)

Mid-Term 2

This exam contains 8 pages (including this cover page) and 5 problems. When the exam begins, check for missing pages. Enter all requested information on the top of this page.

You may *not* use your books, notes, or any calculator on this exam.

You are required to show your work on each problem on this exam. The following rules apply:

- You have 50 minutes to complete the exam, starting at the beginning of class.
- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.
- **Mysterious or unsupported answers will not receive full credit**. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
- If you need more space, use the back of the pages; clearly indicate when you have done this. Scratch paper appears at the end of the document.

Problem	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
Total:	50	

Do not write in the table to the right. Good luck![a]

[a] November 3, 2018,

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1. (10 points) Find the minimum and maximum values of

$$f(x) = x^3(1-x)^4$$

on the interval $[0, 1]$.

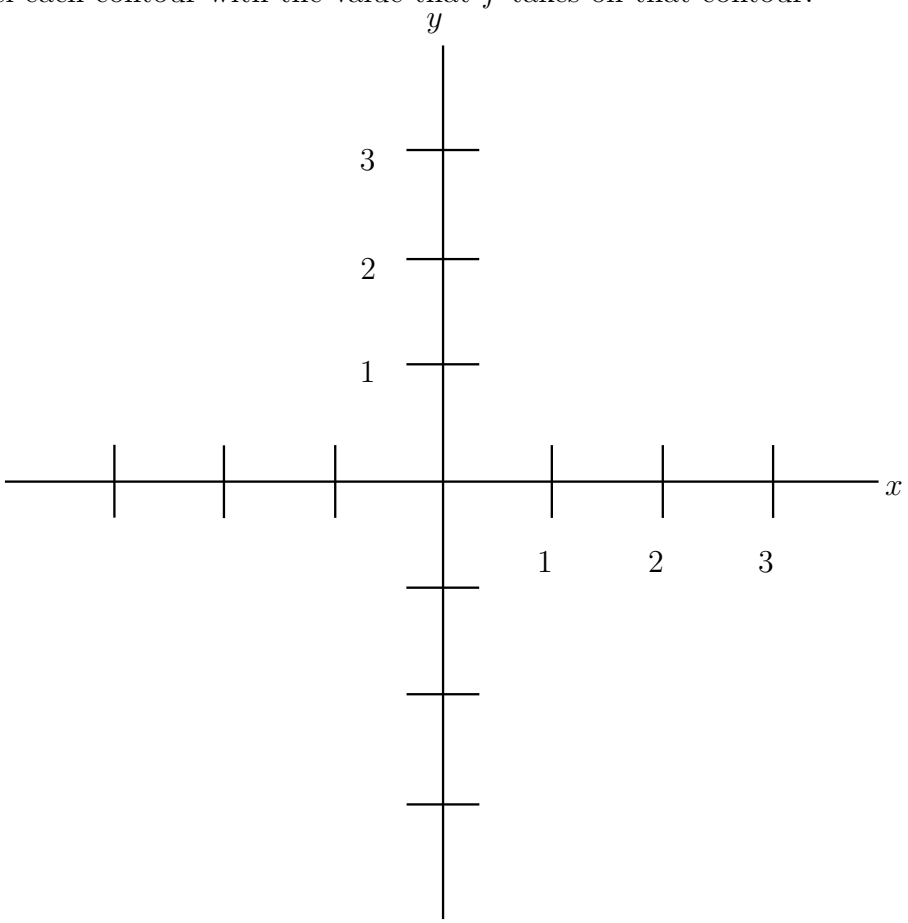
2. (a) (4 points) Find the length of the following vector

$$(1, 2, 3) + 2 \cdot (2, 3, 5)$$

(b) (6 points) Sketch the function

$$f(x, y) = \frac{1}{xy}$$

using a contour plot.
Only plot the contours $f(x, y) = -1$**,** $f(x, y) = 1$ **and** $f(x, y) = \frac{1}{2}$**.**
Label each contour with the value that f takes on that contour.



3. (10 points) The following table summarizes some data about a function $f\colon \mathbf{R} \to \mathbf{R}$. We assume that f' and f'' exist and are continuous on all of $\mathbf{R}$. We list several points $x \in \mathbf{R}$, and we also list the values of: $f'(x)$, $f''(x)$. Using the following table, identify all of the listed local maxima, local minima, and inflection points, by writing an X in the corresponding column of the table.

   If the point cannot be identified as a local extremum using the data at hand, and if the point cannot be identified as an inflection point with the data at hand, write an X in the column labelled "unknown." Also, if you know for sure that the point is not a local extremum and this point is not an inflection point, write an X in the column labelled "unknown."

   It is also given information that $f''(x) > 0$ on the interval $(5, 7)$ and $f''(x) < 0$ on the interval $(7, 8)$, and $f''(x) > 0$ on the interval $(8, 10)$.

   You do not need to show any work for this question.

x	$f'(x)$	$f''(x)$	local maximum	local minimum	inflection point	unknown
1	0	1				
2	0	0				
3	1	0				
4	0	-3				
5	-1	2				
6	0	2				
7	1	0				
8	0	0				
9	1	2				
10	1	0				

4. Compute the following integrals.

(a) (5 points) $\int_1^3 (x^{-2} + e^{2x})dx.$

(b) (5 points) $\int x \ln(x)dx.$

5. Compute the following integrals.

(a) (5 points) $\int t^3(t^4+1)^5 dt.$

(b) (5 points) $\int_{-2}^{2} t^{77} e^{t^4} dt.$

(Scratch paper)