Practice Midterm 1

UCLA: Math 31A, Fall 2017

Instructor: Jens Eberhardt
Date: 08 October 2017

- This exam has 4 questions, for a total of 16 points.
- Please print your working and answers neatly.
- Write your solutions in the space provided showing working.
- Indicate your final answer clearly.
- You may write on the reverse of a page or on the blank pages found at the back of the booklet however these will not be graded unless very clearly indicated.
- Non programmable and non graphing calculators are allowed.

Name: _____

ID number: _____

Discussion section (please circle):

Day/TA	Allen Boozer	Ben Szczesny	Fan Yang
Tuesday	1A	1C	1E
Thursday	1B	1D	1F

Question	Points	Score
1	4	
2	4	
3	4	
4	4	
Total:	16	

1. Consider the following function

$$f(x) = \begin{cases} x^2 + x + 1 & \text{if } x \leq 3 \\ \sqrt{6x + 7} & \text{if } x > 3. \end{cases}$$

   (a) (2 points) Using the limit laws, determine the left-hand and right-hand limit of $f(x)$ at $x = 3$.

   (b) (1 point) Does the limit of $f(x)$ at $x = 3$ exist?

   (c) (1 point) Is $f(x)$ continuous at $x = 3$? If not, which type of discontinuity does it have?

2. (4 points) Determine the indeterminate form and compute the following limit algebraically

$$\lim_{x \to 1} \left(\frac{x+5}{x^2+x-2} - \frac{2}{(x-1)} \right)$$

3. Consider the function

$$f(x) = x^3 + 1$$

(a) (3 points) Compute $f'(1)$ using the definition of the derivative. You are *not* allowed to use the power rule!

(b) (1 point) Determine the equation of the tangent line of $f(x)$ at $x = 1$.

4. Compute the following derivatives. You may use all rules learned so far.
   (a) (2 points) $\frac{d^2}{dx^2}(3x^3 + 4x^2 + 2x - 1)$
   (b) (2 points) $\frac{d}{dx}\frac{x^2+1}{2x}$

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