Math 16A, Section 3 - Fall 2017
Instructor: Christopher O'Neill
Practice Exam 1

Last Name: _____ **First Name:** _____

Directions:

- The use of a calculator, cell phone, laptop or computer is prohibited.
- TURN OFF cell phones and put them away. If a cell phone is seen during the exam, your exam will be collected and you will receive a zero.
- Answer all of the questions, and present your solutions in the space provided. *Show all your work* neatly and concisely and *clearly indicate your final answer*. You will be graded not merely on the final answer, but on the quality and correctness of the work leading up to it.

The UC Davis Code of Academic Conduct

I will conduct myself with honesty, fairness, and integrity.

Signature: _____

(1) For each of the following, draw the graph of a function $f(x)$ with the specified properties. You do *not* need to give a formula for the function, just draw a graph.

(a) $f(3) = 4$, but $\lim_{x \to 3} f(x) = 2$.

(b) $\lim_{x \to 1^-} f(x) = 3$, $\lim_{x \to 1^+} f(x) = -2$, and $f(1)$ is undefined.

(2) Evaluate each of the following limits.

(a) $\lim_{x \to -1} \dfrac{x^2 + 2x + 1}{x^3 - x^2 - 2x}$

(b) $\lim_{x \to 0} \dfrac{\sqrt{x+9} - 3}{x}$

(c) $\lim_{x \to \infty} \dfrac{12x^3 + 21x^2}{4x^3 + 17}$

(d) $\lim_{x \to 2} \dfrac{|x-2|(x+3)}{x-2}$

(e) $\lim_{x \to 4} \sqrt{x+5} + 7$

(3) This problem concerns the following function.

$$f(x) = \frac{1}{x-2} + 7.$$

(a) Find the inverse of $f(x)$.

(b) Verify that $f^{-1}(f(x)) = x$.

(4) Consider the triangle formed by the following 3 lines.

(i) The line with slope 2 and y-intercept 3.
(ii) The line with slope $\frac{2}{3}$ containing the point $(2, 3)$.
(iii) The line containing the points $(1, 5)$ and $(3, 1)$.

Find the vertices of the triangle.

(5) Find the possible values of a and b so that $f(x)$ is continuous for all x.

$$f(x) = \begin{cases} x^2 + ax + 1 & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ b - x & \text{if } x > 1 \end{cases}$$