

Name: _____

Signature: _____

TA's Name: _____

Math 1A, Sample midterm

Discussion section: _____

Instructions: *Show your work. Unjustified answers will not receive credit. Your signature above certifies that the work here is your own.*

1. (a) Let f be a function, and a, L be real numbers. Define carefully: $\lim_{x \rightarrow a} f(x) = L$ if and only if ...

- (b) Show directly from the definition that $\lim_{x \rightarrow 3} 2x = 6$.

2. Let $f(x) = \sqrt{x}$ for all x . Prove directly from the definition of derivative that $f'(a) = \frac{1}{2\sqrt{a}}$.

3. Let $f(x) = \sqrt{3 - e^{2x}}$.

- (a) Explain why f is one-one.
- (b) What is the domain of f^{-1} ?
- (c) Find a formula for f^{-1} .

4. Problem 3, page 127, and problems 37-39 on page 164. (These involve graphs, so please look them up.)

5. Compute (a) $\lim_{x \rightarrow 3^+} \frac{x^2-9}{x^2+2x-3}$ (be as precise as possible).

(b) $\lim_{x \rightarrow 3} \frac{x^2-9}{x^2-2x-3}$

(c) $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2-9}}{2x+5}$.

(d) $\lim_{t \rightarrow 0} \frac{\cot(2t)}{t}$.

6. Compute (a) $\frac{d}{dt}(t^{\frac{1}{3}}\text{sect}(t))$.

(b) $\frac{d}{du}\left(\frac{u}{u^2+1}\right)$.

7. Find an equation for the line which is normal to the curve consisting of all points (x, y) satisfying $y = \frac{xe^x}{x^2+1}$, at the point $(0, 0)$ on this curve.

8. Problem 50, page 190. (This involves a graph; please look it up.)