

MIDTERM EXAM I
Math 16A
Temple-Fall 2012

–Print your name, section number and put your signature on the upper right-hand corner of this exam. Write only on the exam.

–Show all of your work, and justify your answers for full credit.

SCORES

#1

#2

#3

#4

#5

#6

#7

TOTAL:

1. Let $f(x) = \left(\frac{x^2-16}{x-4}\right)^{12}$. Evaluate the following limits: (Do not simplify)

(a) (7 pts) $\lim_{x \rightarrow 2} \left(\frac{x^2-16}{x-4}\right)^{12}$

(b) (7 pts) $\lim_{x \rightarrow 4} \left(\frac{x^2-16}{x-4}\right)^{12}$

2. (14 pts) Find all vertical and horizontal asymptotes and sketch the graph of the function $f(x) = \frac{3x+1}{x-1}$. Justify your answer.

3. (14 pts) Find *all* vertical asymptotes and sketch the graph of the function $f(x) = \tan(x)$ for $0 \leq x \leq 2\pi$.

4. (14 pts) Let $f(x) = 2x^2$. Find the equation of the line passing through the two points on its graph $(1, f(1))$ and $(2, f(2))$. Sketch a graph the function f and the line.

5. (14 pts) Use the definition of derivative to find the slope $\frac{dy}{dx} = f'(2)$ of the line tangent to the graph of $f(x) = 2x^2$ at the point $(2, f(2))$. Sketch the graph and the tangent line.

$$\left(\text{Recall : } f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} \right)$$

6. (a) (7 pts) Give a formula for a function $f(x)$ that is not continuous at $x = 2$, but such that $\lim_{x \rightarrow 2} f(x) = 3$.

(b) (7 pts) Give a formula for a function $f(x)$ such that f is continuous at $x \neq 2$, but $\lim_{x \rightarrow 2} f(x)$ does not exist.

7. Let $f(x) = \frac{1}{4-x}$.

(a) (5 pts) What is the Domain of f .

(b) (5 pts) Find a formula for the inverse f^{-1} .

(c) (6 pts) Find the Domain of $(f \circ f)(x) = f(f(x))$.