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) \( \lim_{x \to 2} \left( \frac{x^2-16}{x-4} \right)^{12} \)

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

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\left( \text{Recall : } f'(x) = \lim_{\Delta x \to 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 $\lim_{x \to 2} f(x) = 3$.

(b) (7 pts) Give a formula for a function $f(x)$ such that $f$ is continuous at $x \neq 2$, but $\lim_{x \to 2} f(x)$ 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 \((f \circ f)(x) = f(f(x))\).