Directions: Each quiz should be completed in 20 minutes. Use the answer key to assign yourself a score. Please grade yourselves harshly.

Quiz 1

1. Evaluate $\lim\limits_{x \to 2} \dfrac{x^{10} - 2^{10}}{x^5 - 2^5}$

   [10 pts]

2. The position of a particle is given by $p(t) = t^2$. Calculate the velocity of the particle at $t = 1$.

   [10 pts]

3. Suppose that *f(x)* is a bounded function that satisfies

$$1 \le f(x) \le 5$$

   Calculate $\lim\limits_{x \to 0} x^2 f(x)$

   [10 pts]

Quiz 2

1. Compute $\lim\limits_{x \to -\infty} \dfrac{\sqrt{5x^2 - 2}}{x + 3}$

   [10 pts]

2. Let $f(x) = \dfrac{x^4 - 1}{x - 1}$. For which x is *f(x)* discontinuous? Is the discontinuity(s) removable or not?

   [10 pts]

3. Suppose $\lim\limits_{x \to \infty} f(x) = 5$, what is $\lim\limits_{x \to 0^+} f\left(\dfrac{1}{x}\right)$?

   [10 pts]

Quiz 3

1. Let f: $[0, 1] \rightarrow (0, 1)$ be continuous. Show that for some x $\in$ $[0, 1]$ $f(x) = x^2$

   [10 pts]

2. Prove using a $\delta - \varepsilon$ argument that $\lim_{x \to -3}(2x + 1) = -5$ [10 pts]

3. Prove using a $\delta - \varepsilon$ argument that $\lim_{x \to 1}(x^2 - 2x) = -1$ [10 pts]

Quiz 4

1. Let $f(x) = \begin{cases} x^2 Sin\left(\dfrac{1}{x}\right) & if \ x \neq 0 \\ 0 & if \ x = 0 \end{cases}$

   (a) Determine whether $f'(0)$ exists.   [5 pts]
   (b) Is f continuous at x = 0? How do you know?   [5 pts]

2. (a) Let $f(x) = x^{1/5}$. Use the definition of the derivative to compute $f'(x)$. [5 pts]
   (b) For what x is f differentiable?   [5 pts]

3. Let $f(x) = 2x^3 - x + 7$. Find the equation of the tangent line at the point x = 1.

   [10 pts]

4. Does the equation $\sqrt[3]{x} = 1 - x$ have a solution in (0, 1)? Justify your answer
   [10 pts]