Practice Test 1

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Please note that this practice test DOES NOT contain all possible problems that could appear on the test on Thursday, just a representative sample. Also, please study the definitions. They may well appear on the test and give you an opportunity to pick up points without calculating anything.

Problem 0.1. Let $f(x) = 7x^2 - 28x - 18$. Complete the square and graph the resulting parabola labeling the vertex. Indicate if the parabola opens up or down and briefly explain why.

Problem 0.2. Let $g(x) = \frac{x^2-4}{x-2}$ for $x \neq 2$. Is it possible to define $g(2)$ in such a way that $g(x)$ is continuous at $x = 2$. If it is possible, give the value of $g(2)$ that makes it possible and explain why the resulting function is continuous. If it is not possible, explain why.

Problem 0.3. Determine if the following limits exist. If a given limit exists, determine its value. If it does not exist, explain why.

$$a) \ \lim_{x \to 3} \frac{1}{(x-3)^5}.$$

$$b) \ \lim_{x \to 5} \frac{\sqrt{x+4} - 3}{x - 5}.$$

Problem 0.4. Compute the slope of the tangent line for the curve $y = 2x^2 + 3$ at the point $(2, 11)$. Do the same for the curve $y = \frac{1}{x-1}$ at the point $(2, 1)$.

Problem 0.5. Let $f(x) = sin^2(x)$, $g(x) = \frac{2}{x^2+2^x}$, and $h(x) = \frac{x}{x+1}$. Compute $f(g(h(x)))$.

Problem 0.6. (EXTRA CREDIT) Prove using the $\epsilon - \delta$ definition that $\lim_{x \to 2} x^3 + x = 10$.