

Calculus I
Sample Exam 1

Do all ten problems. For maximum credit, show your work and justify your answers; answers alone will seldom receive full credit. If you show your work and if your answer is wrong, you may still receive partial credit. Each of the ten problems is worth 10 points.

1. Find $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$ or explain why it doesn't exist.
2. Compute the derivative of $f(x) = \sqrt{x+1}$ directly from the limit definition of the derivative. **Do not** use any shortcuts.
3. Compute $\frac{d}{dt}(t^8 + 6t^7 - 18t^2 + 2t - 1/t)$.
4. Compute $\frac{d}{dx} x^3 \sqrt{x^3 + 3x^2 + 5}$.
5. Compute $\frac{d}{dx} \frac{1}{(x^2 + 3)^2}$.
6. Compute $\frac{d}{dx} \frac{5(x^2 + 3)}{\sqrt{15 + x^2}}$.
7. Compute $\frac{d}{dx} (\sqrt{x} + x^2)^{47} (x^2 + 2)$.
8. Compute $\frac{d}{dx} \sqrt{x^2 + \sqrt{x^3 - x}}$.
9. Suppose a ball is thrown straight up so that its height at time t is $30t - 16t^2$ meters. How fast is the object going at time $t = 1$?
10. Find an equation for the tangent line to $f(x) = 4x^2$ at $x = 1$.