MATH 133 – Calculus with Fundamentals 1
The Derivative of a Function, Continued
October 17, 2017

Background

We will now concentrate on finding *general formulas* for derivatives.

Questions

(0) Use the definition to compute $f'(a)$ if f is the linear function $f(x) = 5x + 3$. Does your answer make sense in terms of $f'(a)$ as the slope of the tangent line?

(1) Compute $f'(a)$–the derivative at a general $x = a$ for $f(x) = x^2$.

(2) Compute $f'(a)$–the derivative at a general $x = a$ for $f(x) = x^3$.

(3) Compute $f'(a)$–the derivative at a general $x = a$ for $f(x) = \sqrt{x}$. Here there is a restriction on which a "work." What is that restriction? Does this make sense, thinking of the graph $y = \sqrt{x}$? (Note: this is part of the parabola with equation $x = y^2$.)

(4) Compute $f'(a)$–the derivative at a general $x = a$ for $f(x) = \frac{1}{x}$. Does your formula make sense, thinking of the shape of the graph $y = \frac{1}{x}$? In particular, what is true about $f'(a)$ if a is very close to zero? And what about a very large in absolute value?

(5) Can you see a general pattern in all of these examples? Think about writing $\sqrt{x}$ and $\frac{1}{x}$ as powers. Do they fit the same pattern?