Math 1300: Calculus I **Fall 2020**

Lecture: Section 3.8: Rates of Change

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Today's Goal: More practice!

Logistics: This is a supplement to our 3.8 lecture notes.

Warm-Up 1.1 $\frac{d}{dx}(f(\log_2(x)) = \cdots$

(A) $f'\left(\frac{1}{\ln(2)x}\right)$

(B) $\frac{f'(\log_2(x))}{x\ln(2)}$

(C) $\frac{f(\log_2(x))}{x\log_2(x)}$

(D) $\frac{1}{\ln(2)f(x)}$

(E) None of the above.

Example 1.2 *A particle moves along a horizontal line so that its coordinate at time t is $x = \sqrt{b^2 + c^2t^2}$, for $t \geq 0$ where b and c are positive constants.*

(a) Find the velocity and acceleration functions.

(b) Show that the particle always moves in the positive direction.

Example 1.3 *The volume of a right circular cone is $V = \frac{1}{3}\pi r^2 h$, where r is the radius of the base and h is the height.*

(a) Find the rate of change of the volume with respect to the height if the radius is constant.

(b) Find the rate of change of the volume with respect to the radius if the height is constant.

Example 1.4 *Find f' in terms of g':*

1. $f(x) = x^2 g(\sin(x))$

2. $f(x) = \log_3(g(x))$

3. $f(x) = g(\log_5(x))$

4. $f(x) = g(\ln(g(x)))$

Example 1.5 *Find y':*

$$x^2 \cos(y) + \sin(2y) = xy$$