Math 151
Section 3.10: Linear Approximation and Differentials

Video 1: "Finding the Linearization at a Point / Tangent Line Approximation" with URL
https://youtu.be/BPSNisGXe7U

Example 1: (length 4:10) Find the linearization of $f(x)=\frac{1}{\sqrt{7+x}}$ at $x=0$.

Video 2: "Finding a Linear Approximation (Linearization, Tangent Line Approx), Another Ex 1" with URL https://youtu.be/aaQiNUoZnLE

Video 3: "Finding a Linear Approximation (Linearization, Tangent Line Approx), Another Ex 2" with URL https://youtu.be/Ja2Suuuqjvs

Example 2: (start 0:00 and end 6:53) Find a linear approximation to the given function at the given point.

a.) (Video 2, length 1:59) $f(x) = 2^x$ at $x = 3$

b.) (Video 3, length 1:46) $f(x) = \cos x$ at $x = \frac{\pi}{4}$

Video 4: “Tangent Line Approximation / Linearization - Ex 1” with URL https://youtu.be/llV8Zo7IbaY

Example 3: (start 0:00 and end 5:13) Use a linear approximation to approximate the value of each of the following:

a.) (video 4, length 4:48) $\sin\left(\frac{18\pi}{17}\right)$

b.) (no video, solution on my webpage) $\sqrt{15.9}$

a.) Approximate $\sin\left(\frac{18\pi}{17}\right)$

b.) Approximate $\sqrt{15.9}$

Video 5: “Using Differentials” at the URL https://youtu.be/cXIQKIj-NSo

Example 4: (start 0:00 and end 7:37) Use differentials to approximate the value of $18^{1/4} = \sqrt[4]{18}$

Vocabulary: $dy = \text{differential (the approximate change)}$ $\Delta y = \text{the true change in } y$ with the formula is $dy = f'(x)\,dx$