3.10 Linear Approximations

1. a linear approximation of a function f is a local approximation of a function by its tangent line at that point $x = a$: $f(x) \approx f(a) + f'(a)(x - a)$.
2. this process is called linearization, and it helps estimate values of f at point nearby a
3. differentials: tell you how good your linearization is since $dy \neq \Delta y$ (unless your function is already linear).
4. Let f be a function, and let a and b be two input values. Then:
   - $\Delta x = b - a$ which equals the the differential $dx = b - a$ (the change in the input)
   - $f(x) = y \to f'(x) = \frac{dy}{dx}$ and so the differential $dy = f'(x)dx$
   - $\Delta y = f(b) - f(a)$ (it is the change of the function from a to b).