## Answer on Question #65787 – Math – Calculus

### Question

Take 10 figure logarithm to base 10 from $x = 300$ to $x = 310$ by unit increment. Calculate the first derivative of $\log_{10} x$ when $x = 310$.

### Solution

Let us construct the following table:

| $x$ | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $\log_{10} x$ | 2.477 | 2.479 | 2.48 | 2.481 | 2.483 | 2.484 | 2.486 | 2.487 | 2.489 | 2.49 | 2.491 |

(see https://en.wikipedia.org/wiki/Common_logarithm).

Since $\frac{d}{dx}(\log_{10} x) = \frac{1}{x \ln 10}$

(see http://tutorial.math.lamar.edu/Classes/CalcI/DiffExpLogFcns.aspx), then

$$\frac{d}{dx}(\log_{10} x)|_{x=310} = \frac{1}{310 \ln 10} \approx 0.0014.$$

**Answer:** $\frac{d}{dx}(\log_{10} x)|_{x=310} \approx 0.0014.$