

MITOpenCourseWare - Lecture 1

Daniel Frederico Lins Leite

September 2016

1 - Move the red slider to $x = 0.75$; we'll investigate the slopes of secant lines passing through the point $(0.75, f(0.75))$. (a) Use the yellow slider to find the value of y when $x = 0.75$ and x has each of the following values: 0.5, 0.25, 0.25, 0.5.

$$-0.50 = 0.56 - 0.25 = 0.180.25 = -0.390.50 = -0.58$$

(b) Use the Tangent checkbox to find the (approximate) slope of the tangent line to the graph of $f(x)$ at $x = 0.75$.
slope is

$$-0.14$$

(c) Find a value of x for which the value of y/x is within 0.1 units of x the slope of the tangent line.
when

$$\delta x < 0.01$$

2 - Now use the red slider to set $x = 0$. (a) Find y when $x = 0$ and x has the values: x

$$0.5 = 0.440.25 = 0.24250.25 = -0.24250.5 = -0.44$$

(b) Find the slope of the tangent line to the graph of $f(x)$ at $x = 0$.
slope is

$$-1$$

(c) Find a value of x for which the value of y is within 0.1 units of x the slope of the tangent line.
when

$$\delta x < 0.01$$

3 - Let $x = 0.75$. y (a) Find y/x when $x = 0.75$ and x has the values:

$$0.5 = -0.590.25 = -0.410.25 = 0.160.5 = 0.53$$

(b) Find the slope of the tangent line to the graph of $f(x)$ at $x = 0.75$.
when slope is

$$-0.16$$

(c) Find a value of x for which the value of y is within 0.1 units of y/x the slope of the tangent line.

0.01

4. Compare your answers to the previous problems. (a) Was your answer to part (c) the same for each problem?

yes

(b) For some values of x , x was close to the slope of the tangent line when x was 0.5. For others it was not. Can you make any conjectures about when you need a very small value of x in order for y/x to be close to the slope of the tangent line?

You need very small values when the function is "very different" around the point. If for example the function is very similar to a linear function the x can be bigger.