

## Linear Approximation

The tangent line through the point  $(c, f(c))$  can be used to approximate values of the function  $f(x)$  for values of  $x$  close to  $x = c$ .

At the point  $(c, f(c))$ , the slope is  $f'(c)$ . Using the point slope formula, we have the equation  $y = f(c) + f'(c)(x - c)$ .

We can write  $L(x) = f(c) + f'(c)(x - c)$  to denote the fact that this line is the linearization of the original function.

**Example:** Use the linearization of  $f(x) = \sqrt{x}$  at  $x = 4$  to approximate the following values. Compare them to the values you get using your calculator.

- a)  $\sqrt{3.9}$
- b)  $\sqrt{4.1}$
- c)  $\sqrt{5}$
- d)  $\sqrt{7}$
- e) What happens to the accuracy of your approximation as  $x$  gets farther from 4?