We have seen that when we zoom in on a curve, it begins to look like a line. We can use the equation of the tangent line at a given x-value to approximate y-values of a function for nearby x-values. This is called local linearization.

Use the given x-value to find a y-value; use the derivative to find the slope. Write the equation of the tangent line. This equation can approximate y-values for x-values that are in the neighborhood.

Example: (a) $Find\ the\ linearization\ of\ f(x) = \sqrt{x}\ at\ x = 100.$

pt. (100, 10) $f'(100) = \frac{1}{2}(100)^{-\frac{1}{2}} = \frac{1}{20}$

$y - 10 = \frac{1}{20}(x - 100)$ or $y = \frac{1}{20}x + 5$

(b) Use the linearization to approximate $\sqrt{102}$.

$$\sqrt{102} \approx \frac{1}{20}(102) + 5 \approx 5.1 + 5 \approx 10.1$$