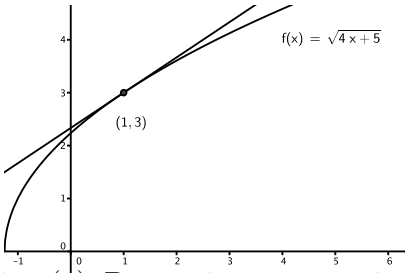


1. (a) Determine an equation of the tangent line to the graph of $f(x) = \sqrt{4x+5}$ at the point $(1, f(1))$.

   (b) Determine the **linearization/linear approximation/tangent line approximation** of $f(x) = \sqrt{4x+5}$ at the point $(1, f(1))$.

   (c) Complete the table. Record each answer rounded to the nearest ten-thousandth.

x	$f(x) = \sqrt{4x+5}$	$L(x)$ at $(1, f(1))$
1		
1.01		
1.1		
15		

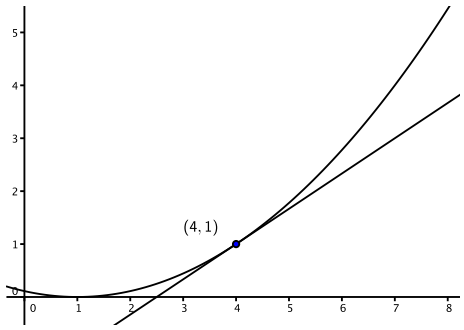
   (d) Use the linearization of $f(x) = \sqrt{4x+5}$ at $(1, f(1))$ to approximate $f(1.001)$.

The General Formula: The linear approximation of f at a is $\boxed{L(x) = f(a) + f'(a)(x-a).}$

2. Application. Use a linear approximation to estimate $\sqrt[3]{63.7}$. Compare your answer with a calculator's approximation of $\sqrt[3]{63.7}$.

- On *the graph of* f: Δx is the change in x-values and Δy is the change in y-values
- On *the tangent line*: dx is the change in x-values and dy is the change in y-values
- We can use dy, the change in y on the tangent line, to *estimate* Δy, the change in y on the graph. The expression dx represents the exact change in x.

Formula. The *differential* of the function $y = f(x)$ is $\boxed{dy = f'(x)dx.}$
How do we get the formula for the differential?



1. If $f(x) = \arcsin(3x)$, determine the differential df.

$$\text{Percentage error} = \left| \frac{\text{error}}{\text{actual value}} \right| \times 100\%$$

2. About how accurately must the diameter of a circle be measured in order to calculate the area of the circle to within 1% of its true value? Express your answer as a percentage of the diameter.

3. The formula $S = 0.1W^{2/3}$ calculates the surface area of a horse from its mass W (in kilograms) If the estimated mass of a horse is 280 kg with a maximum measurement error of 0.5 kg, determine the maximum percentage error in the calculation of the horse's surface area.