

Name _____ Score _____ Teacher _____ Date _____

Use the supplied graph and exact function values to find $\Delta y = f(b) - f(a)$ and $dy = f'(a)(b - a)$.

$$f(x) = -2 \cdot x + x^2 + 3$$

$$dy = \underline{\hspace{2cm}}$$
$$f(x) = \frac{-1}{2} \cdot \cot(2 \cdot x)$$

$$dy = \underline{\hspace{2cm}}$$
$$f(x) = 3 \cdot x - 2 \cdot x^2 + x^3 - 1$$

$$dy = \underline{\hspace{2cm}}$$
$$f(x) = \sin(x)$$

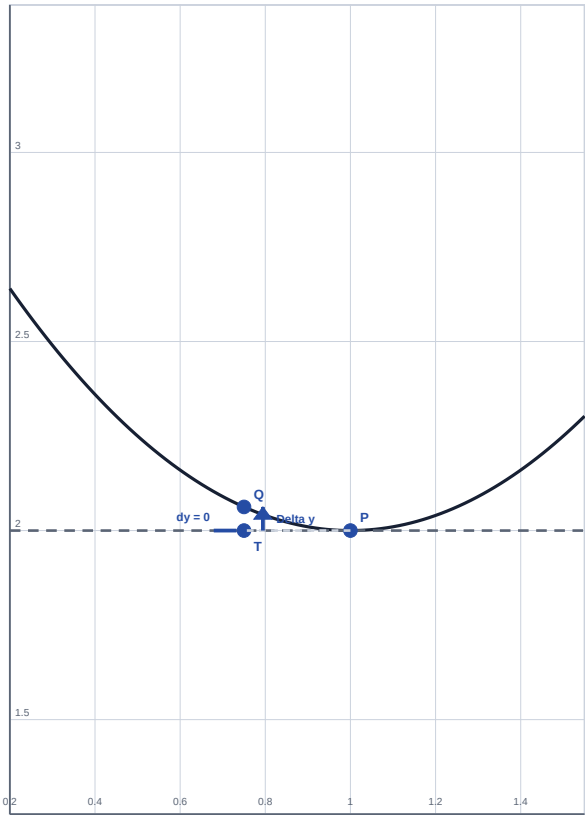
$$dy = \underline{\hspace{2cm}}$$

Graphing Differentials

Worked Answer Key

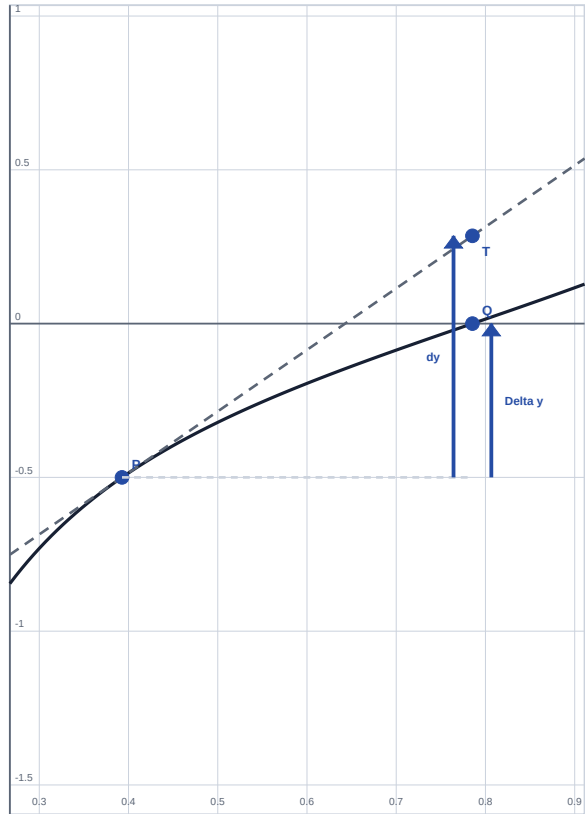
Use the supplied graph and exact function values to find Delta y = f(b) - f(a) and dy = f'(a)(b - a).

1. Actual curve change and tangent change



$f(x) = -2 \cdot x + x^2 + 3$
 $f'(x) = 2 \cdot x - 2$
 $a = 1$
 $b = \frac{3}{4}$
 $\Delta x = b - a = \frac{-1}{4}$
 $f(a) = 2$
 $f(b) = \frac{33}{16}$
 $f'(a) = 0$
 $\Delta y = f(b) - f(a) = \frac{1}{16}$
 $dy = f'(a) \Delta x = 0$
 $L(b) = f(a) + dy = 2$
Q shows the signed actual change from f(a); T shows the signed tangent change. All real x.

2. Actual curve change and tangent change



$f(x) = \frac{-1}{2} \cdot \cot(2 \cdot x)$
 $f'(x) = \csc(2 \cdot x)^2$
 $a = \frac{1}{8} \cdot \pi$
 $b = \frac{1}{4} \cdot \pi$
 $\Delta x = b - a = \frac{1}{8} \cdot \pi$
 $f(a) = \frac{-1}{2}$
 $f(b) = 0$
 $f'(a) = 2$
 $\Delta y = f(b) - f(a) = \frac{1}{2}$
 $dy = f'(a) \Delta x = \frac{1}{4} \cdot \pi$
 $L(b) = f(a) + dy = \frac{1}{4} \cdot \pi - \frac{1}{2}$
Q shows the signed actual change from f(a); T shows the signed tangent change. $\sin(2 \cdot x) \neq 0$.

Graphing Differentials

Worked Answer Key

Use the supplied graph and exact function values to find Delta y = f(b) - f(a) and dy = f'(a)(b - a).

3. Actual curve change and tangent change

$f(x) = 3 \cdot x - 2 \cdot x^2 + x^3 - 1$
 $f'(x) = -4 \cdot x + 3 \cdot x^2 + 3$
 $a = 2$
 $b = 1$
 $\Delta x = b - a = -1$
 $f(a) = 5$
 $f(b) = 1$
 $f'(a) = 7$
 $\Delta y = f(b) - f(a) = -4$
 $dy = f'(a) \Delta x = -7$
 $L(b) = f(a) + dy = -2$

Q shows the signed actual change from f(a); T shows the signed tangent change. All real x.

4. Actual curve change and tangent change

$f(x) = \sin\left(x\right)$
 $f'(x) = \cos\left(x\right)$
 $a = 0$
 $b = \frac{1}{6} \cdot \pi$
 $\Delta x = b - a = \frac{1}{6} \cdot \pi$
 $f(a) = 0$
 $f(b) = \frac{1}{2}$
 $f'(a) = 1$
 $\Delta y = f(b) - f(a) = \frac{1}{2}$
 $dy = f'(a) \Delta x = \frac{1}{6} \cdot \pi$
 $L(b) = f(a) + dy = \frac{1}{6} \cdot \pi$

Q shows the signed actual change from f(a); T shows the signed tangent change. All real x.