

G) Find the derivative of $f(x) = \sin x$ at $x = \frac{\pi}{6}$

$$\left(\frac{\pi}{6}, \sin\frac{\pi}{6}\right) \rightarrow \left(\frac{\pi}{6}, \frac{1}{2}\right)$$

$$f'(x) = \cos x$$

$$f'\left(\frac{\pi}{6}\right) = \cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$$

$$f'\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$$

H) Find the derivative of $f(x) = \arcsin x$ at $x = \frac{1}{2}$

$$\left(\frac{1}{2}, \frac{\pi}{6}\right)$$

$$f'(x) = \frac{1}{\sqrt{1-x^2}}$$

$$f'\left(\frac{1}{2}\right) = \frac{2}{\sqrt{3}}$$

$$f'(x) = \frac{1}{\sqrt{1-\frac{1}{4}}} = \frac{1}{\sqrt{\frac{3}{4}}} = \frac{1}{\left(\frac{\sqrt{3}}{\sqrt{4}}\right)} = \frac{2}{\sqrt{3}}$$

1. Let f be a differentiable function such that

$$(3, 15) \\ m = -8$$

$$f(3) = 15, f(6) = 3, f'(3) = -8 \text{ and}$$

$$f'(6) = -2.$$

The function g is differentiable and $g(x) = f^{-1}(x)$ for all x . What is the value of $g'(15)$?

$$(15, 3) \\ m =$$

a) $-1/2$ b) $-1/8$ c) $1/6$ d) $1/3$

e) The value of $g'(15)$ cannot be determined

function $(8, 4)$
 $m = 3$

Inverse $(4, 8)$
 $m = \frac{1}{3}$

2. Let f be a differentiable function such that $f(3) = 5$, $f(8) = 4$, $f'(3) = 6$ and

$$f'(8) = 3.$$

The function g is differentiable and $g(x) = f^{-1}(x)$ for all x . What is the value of $g'(4)$?

- a) $-1/2$ b) $-1/8$ c) $1/6$ **d) $1/3$**
e) The value of $g'(4)$ cannot be determined

3. Let f be a differentiable function such that

$$f(3) = 5, f(8) = 4, f'(3) = 6 \text{ and}$$

$$f'(8) = 3. \quad m = 6$$

The function g is differentiable and $g(x) = f^{-1}(x)$ for all x . What is the value of $g'(5)$?

- a) $-1/2$ b) $-1/8$ **c) $1/6$** d) $1/3$
e) The value of $g'(5)$ cannot be determined

$f(x)$
 $(2, -3)$

$$m = \frac{4}{3}$$

$f^{-1}(x)$

$(-3, 2)$

$$m = \frac{3}{4}$$

4. If $f(2) = -3$, $f'(2) = \frac{4}{3}$, and $g(x) = f^{-1}(x)$,

what is the equation of the tangent line to $g(x)$ at $x = -3$?

A) $y - 2 = \frac{-3}{4}(x + 3)$

B) $y + 2 = \frac{-3}{4}(x - 3)$

C) $y - 2 = \frac{3}{4}(x + 3)$

D) $y + 3 = \frac{3}{4}(x - 2)$

E) $y - 2 = \frac{4}{3}(x + 3)$

23 | $y = 2 + \frac{3}{4}(x + 3)$

$$\begin{array}{l} \underline{f(x)} \\ (2, -3) \\ m = -\frac{4}{3} \\ \\ \underline{f^{-1}(x)} \\ (-3, 2) \\ m = -\frac{3}{4} \\ y = 2 - \frac{3}{4}(x+3) \end{array}$$

5. If $f(2) = -3$, $f'(2) = \frac{4}{3}$, and $g(x) = f^{-1}(x)$,

what is the equation of the tangent line to $g(x)$ at $x = -3$?

- A) $y - 2 = \frac{-3}{4}(x + 3)$
- B) $y + 2 = \frac{-3}{4}(x - 3)$
- C) $y - 2 = \frac{3}{4}(x + 3)$
- D) $y + 2 = \frac{4}{3}(x - 3)$
- E) $y - 2 = \frac{4}{3}(x + 3)$

6. If $f(2) = -3$, $f'(2) = \frac{-3}{4}$, and $g(x) = f^{-1}(x)$,

what is the equation of the tangent line to $g(x)$ at $x = -3$?

- A) $y - 2 = \frac{-3}{4}(x + 3)$
- B) $y + 3 = \frac{-4}{3}(x + 2)$
- C) $y - 2 = \frac{3}{4}(x + 3)$
- D) $y + 2 = \frac{4}{3}(x - 3)$
- E) $y - 2 = \frac{-4}{3}(x + 3)$