

Looking at the examples and your homework problems, let's compare each function to its derivative.

Assignment: Long-Hand DerivativesFind $f'(x)$ of each function.

1) $f(x) = 5x - 1$

5

2) $f(x) = x^2$

$2x$

3) $f(x) = 4x + 7$

4

4) $f(x) = x^2 + 3x$

$2x + 3$

5) $f(x) = 3x^3$

$9x^2$

6) $f(x) = \frac{1}{x}$

$-\frac{1}{x^2}$

7) $f(x) = 3x + 2$

3

8) $f(x) = -2x^2 + x - 1$

$-4x + 1$

9) $f(x) = 1 - x^2$

$-2x$

10) $f(x) = x^3$

$3x^2$

You should have discovered that:

$$\text{If } y = x^n \text{ then } \frac{dy}{dx} = nx^{n-1}.$$

Find the gradient function $\frac{dy}{dx}$ for:

a $y = x^6$
 $6x^5$

c $y = x^9$
 $9x^8$

b $y = \frac{1}{x^5}$
 $\frac{-5}{x^6}$

d $y = \frac{1}{x^7}$
 $\frac{-7}{x^8}$

For $f(x) = x^5$, find:

a $f(2)$

$$f(2) = 2^5 = 32$$

c $f(-1)$

$$f(-1) = (-1)^5 = -1$$

b $f'(2)$

$$f'(x) = 5x^4$$

$$\begin{aligned} f'(2) &= 5(2)^4 \\ &= 80 \end{aligned}$$

d $f'(-1) = 5(-1)^4$

$$= 5$$

Consider $f(x) = \frac{1}{x^4}$. x^{-4}

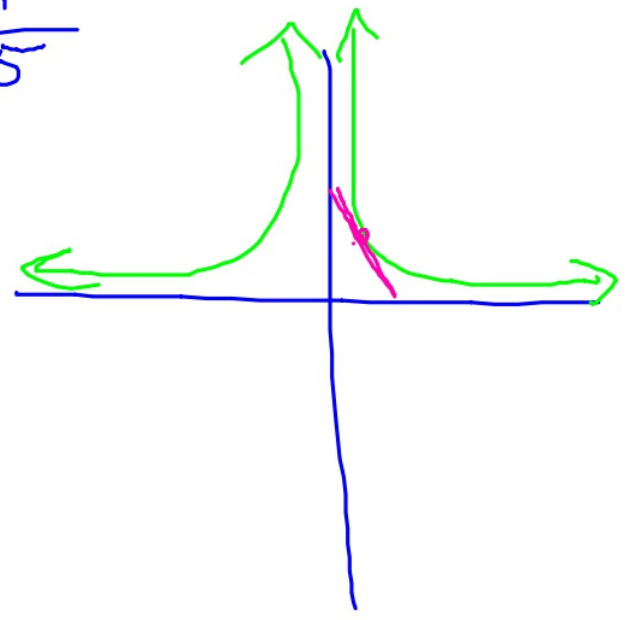
a Find $f'(x)$.

$$f'(x) = -4x^{-5}$$

$$f'(x) = \frac{-4}{x^5}$$

b Find and interpret $f'(1)$.

$$f'(1) = \frac{-4}{1^5} = -4$$

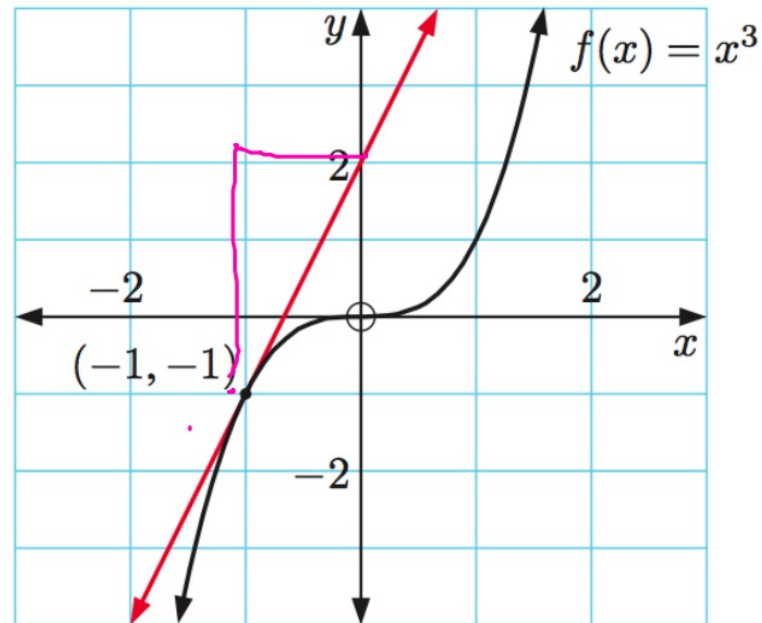


The graph of $f(x) = x^3$ is shown alongside, and its tangent at the point $(-1, -1)$.

- a Use the graph to find the gradient of the tangent.
- b Check your answer by finding $f'(-1)$.

$$\frac{3}{1} = 3$$

$$\begin{aligned} f(x) &= x^3 \\ f'(x) &= 3x^2 \\ f'(-1) &= 3(-1)^2 \\ &= 3 \end{aligned}$$



Complete exercise

20 D #1 a-i, #2.