Topic: Power rule for fractional powers

Question: Differentiate the function.

$$f(x) = \sqrt{x}$$

Answer choices:

A $f'(x) = -\dfrac{1}{2}\sqrt{x}$

B $f'(x) = -\dfrac{1}{2\sqrt{x}}$

C $f'(x) = \dfrac{1}{2\sqrt{x}}$

D $f'(x) = \dfrac{1}{2}\sqrt{x}$

Solution: C

Rewrite the function by converting the radical into a fractional exponent.

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

Apply power rule to differentiate the function.

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

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

Because the original function was given in terms of a root, rewrite this answer with a root instead of a fractional exponent.

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

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

Topic: Power rule for fractional powers

Question: Differentiate the function.

$$f(x) = \frac{4}{\sqrt{x}}$$

Answer choices:

A $f'(x) = -\dfrac{2}{\sqrt{x^3}}$

B $f'(x) = -\dfrac{2}{\sqrt{x}}$

C $f'(x) = -2\sqrt{x^3}$

D $f'(x) = -2\sqrt{x}$

Solution: A

Rewrite the function by converting the radical into a fractional exponent.

$$f(x) = \frac{4}{x^{\frac{1}{2}}}$$

$$f(x) = 4x^{-\frac{1}{2}}$$

Apply power rule to differentiate the function.

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

$$f'(x) = -\frac{4}{2}x^{-\frac{1}{2}-\frac{2}{2}}$$

$$f'(x) = -2x^{-\frac{3}{2}}$$

Because the original function was given in terms of a root, rewrite this answer with a root instead of a fractional exponent.

$$f'(x) = -\frac{2}{x^{\frac{3}{2}}}$$

$$f'(x) = -\frac{2}{\sqrt{x^3}}$$

Topic: Power rule for fractional powers

Question: Differentiate the function.

$$f(x) = \frac{5}{\sqrt[3]{x^2}}$$

Answer choices:

A $f'(x) = -\dfrac{10}{3}\sqrt[3]{x^5}$

B $f'(x) = -\dfrac{10}{3\sqrt[3]{x^5}}$

C $f'(x) = -\dfrac{10}{3\sqrt[3]{x}}$

D $f'(x) = -\dfrac{10}{3}\sqrt[3]{x}$

Solution: B

Rewrite the function by converting the radical into a fractional exponent.

$$f(x) = \frac{5}{x^{\frac{2}{3}}}$$

$$f(x) = 5x^{-\frac{2}{3}}$$

Apply power rule to differentiate the function.

$$f'(x) = 5\left(-\frac{2}{3}\right)x^{-\frac{2}{3}-1}$$

$$f'(x) = -\frac{10}{3}x^{-\frac{2}{3}-\frac{3}{3}}$$

$$f'(x) = -\frac{10}{3}x^{-\frac{5}{3}}$$

Because the original function was given in terms of a root, rewrite this answer with a root instead of a fractional exponent.

$$f'(x) = -\frac{10}{3x^{\frac{5}{3}}}$$

$$f'(x) = -\frac{10}{3\sqrt[3]{x^5}}$$