Topic: Chain rule with power rule

Question: Apply power rule and chain rule to find the derivative.

$$y = (5x^2 + 2x - 8)^5$$

Answer choices:

A $y' = (5x + 2)(5x^2 + 2x - 8)^4$

B $y' = (50x + 10)(5x^2 + 2x - 8)^5$

C $y' = (50x + 10)(5x^2 + 2x - 8)^4$

D $y' = (50x - 10)(5x^2 + 2x - 8)^4$

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Solution: C

Use substitution with $u = 5x^2 + 2x - 8$ and $u' = 10x + 2$, and rewrite the function with the substitution.

$$y = u^5$$

Then the derivative is

$$y' = 5u^4u'$$

Back-substitute.

$$y' = 5(5x^2 + 2x - 8)^4(10x + 2)$$

$$y' = (50x + 10)(5x^2 + 2x - 8)^4$$

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Topic: Chain rule with power rule

Question: Apply power rule and chain rule to find the derivative.

$$f(x) = 8(6x^2 + 2)^4$$

Answer choices:

A $f'(x) = 384x(6x^2 + 2)^3$

B $f'(x) = 384(6x^2 + 2)^3$

C $f'(x) = 32x(6x^2 + 2)^3$

D $f'(x) = 32(6x^2 + 2)^3$

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Solution: A

Use substitution with $u = 6x^2 + 2$ and $u' = 12x$, and rewrite the function with the substitution.

$$f(x) = 8u^4$$

Then the derivative is

$$f'(x) = 32u^3u'$$

Back-substitute.

$$f'(x) = 32(6x^2 + 2)^3(12x)$$

$$f'(x) = 384x(6x^2 + 2)^3$$

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Topic: Chain rule with power rule

Question: Apply power rule and chain rule to find the derivative.

$$f(y) = (y^3 + 1)^{25}$$

Answer choices:

A $f'(y) = (3y^2)^{25}$

B $f'(y) = 25(y^3 + 1)^{24}$

C $f'(y) = 75y^2(y^3 + 1)^{24}$

D $f'(y) = 25(3y^2)^{24}$

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Solution: C

Use substitution with $u = y^3 + 1$ and $u' = 3y^2$, and rewrite the function with the substitution.

$$f(y) = u^{25}$$

Then the derivative is

$$f'(y) = 25u^{24}u'$$

Back-substitute.

$$f'(y) = 25(y^3 + 1)^{24}(3y^2)$$

$$f'(y) = 75y^2(y^3 + 1)^{24}$$

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