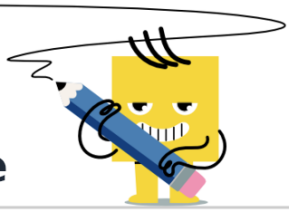
Name



Advanced Derivative Rules - Practice

1 Find the derivative f'(x) using the general exponential rule and the chain rule.

$$\frac{d}{dx}a^u = a^u \ln a \cdot \frac{du}{dx}$$
$$[12pt] f(x) = 2 \cdot 7^x$$

A $f'(x) = 2 \cdot 7^x \ln 7$

B $f'(x) = 2(x) \cdot 7^{x-1}$

C $f'(x) = 2 \cdot 7^x$

D $f'(x) = 2 \cdot 7^x \ln 7 \cdot (x)$

2 Find the derivative f'(x) using the general exponential rule and the chain rule.

$$\frac{d}{dx}a^u = a^u \ln a \cdot \frac{du}{dx}$$
$$[12pt] f(x) = 4 \cdot 7^{\frac{1}{2}\pi x}$$

A $f'(x) = 2\pi \cdot 7^{\frac{1}{2}\pi x}$

B $f'(x) = 2\pi \cdot 7^{\frac{1}{2}\pi x} \ln 7$

C $f'(x) = 4 \cdot 7^{\frac{1}{2}\pi x} \ln 7 \cdot (\frac{1}{2}\pi x)$

D $f'(x) = 4 \cdot 7^{\frac{1}{2}\pi x} \ln 7$

3 Find the derivative f'(x) using the general exponential rule and the chain rule.

$$f(x) = 3 \cdot 6^x$$

A $f'(x) = 3 \cdot 6^x \ln 6 \cdot (x)$

B $f'(x) = 3(x) \cdot 6^{x-1}$

C $f'(x) = 3 \cdot 6^x$

D $f'(x) = 3 \cdot 6^x \ln 6$

4 Find the derivative f'(x) using the general exponential rule and the chain rule.

$$f(x) = 3 \cdot 4^{2\pi x}$$

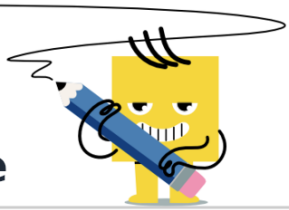
A $f'(x) = 3 \cdot 4^{2\pi x} \ln 4 \cdot (2\pi x)$

B $f'(x) = 6\pi \cdot 4^{2\pi x} \ln 4$

C $f'(x) = 3 \cdot 4^{2\pi x} \ln 4$

D $f'(x) = 6\pi \cdot 4^{2\pi x}$

Name



Advanced Derivative Rules - Practice

5 Find the derivative f'(x) using the general exponential rule and the chain rule.

$$\frac{d}{dx}a^u = a^u \ln a \cdot \frac{du}{dx}$$

$$[12pt] f(x) = 4 \cdot 3^{x^4}$$

A
$$f'(x) = 4 \cdot 3^{x^4} \ln 3$$

B
$$f'(x) = 4 \cdot 3^{x^4} \ln 3 \cdot (x^4)$$

C
$$f'(x) = 4 \cdot 3^{x^4} \cdot 4x^3$$

D
$$f'(x) = 4 \cdot 3^{x^4} \ln 3 \cdot 4x^3$$

6 Find the derivative f'(x) using the general exponential rule and the chain rule.

$$f(x) = 2 \cdot 3^{x^{-1}}$$

A
$$f'(x) = 2 \cdot 3^{x^{-1}} \ln 3 \cdot (-x^{-2})$$

B
$$f'(x) = 2 \cdot 3^{x^{-1}} \ln 3 \cdot (x^{-1})$$

C
$$f'(x) = 2 \cdot 3^{x^{-1}} \cdot (-x^{-2})$$

D
$$f'(x) = 2 \cdot 3^{x^{-1}} \ln 3$$

7 Find the derivative f'(x) using the general exponential rule and the chain rule.

$$\frac{d}{dx}a^u = a^u \ln a \cdot \frac{du}{dx}$$

$$[12pt] f(x) = 2 \cdot 6^{2x^4 - x}$$

A
$$f'(x) = 2 \cdot 6^{2x^4 - x} \ln 6 \cdot (2x^4 - x)$$

B
$$f'(x) = 2 \cdot 6^{2x^4 - x} \ln 6$$

C
$$f'(x) = 2 \cdot 6^{2x^4 - x} \ln 6 \cdot (8x^3 - 1)$$

D
$$f'(x) = 2 \cdot 6^{2x^4 - x} \cdot (8x^3 - 1)$$

8 Find the derivative f'(x) using the general exponential rule and the chain rule.

$$f(x) = 6^{3x^2 - x}$$

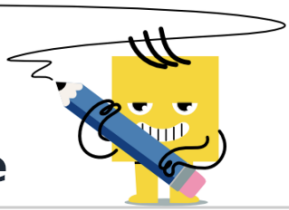
A
$$f'(x) = 6^{3x^2 - x} \ln 6 \cdot (3x^2 - x)$$

B
$$f'(x) = 6^{3x^2 - x} \ln 6$$

C
$$f'(x) = 6^{3x^2 - x} \cdot (6x - 1)$$

D
$$f'(x) = 6^{3x^2 - x} \ln 6 \cdot (6x - 1)$$

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Advanced Derivative Rules - Practice

9 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$\frac{d}{dx}\sin(u) = \cos(u) \cdot \frac{du}{dx}$$

$$[12pt] f(x) = 5\sin x$$

A $f'(x) = 5\sin(x)$

B $f'(x) = -5\cos(x)$

C $f'(x) = 5\cos(x)$

D $f'(x) = 5\cos(x) \cdot (x)$

10 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$\frac{d}{dx}\sin(u) = \cos(u) \cdot \frac{du}{dx}$$

$$[12pt] f(x) = \sin(2x)$$

A $f'(x) = 2\cos(2x)$

B $f'(x) = \cos(2x)$

C $f'(x) = 2\sin(2x)$

D $f'(x) = \cos(2x) \cdot (2x)$

11 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$f(x) = 3\sin x$$

A $f'(x) = 3\cos(x) \cdot (x)$

B $f'(x) = 3\cos(x)$

C $f'(x) = 3\sin(x)$

D $f'(x) = -3\cos(x)$

12 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$f(x) = 4\cos(4x)$$

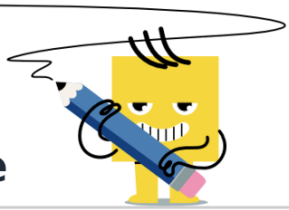
A $f'(x) = -4\sin(4x) \cdot (4x)$

B $f'(x) = 16\cos(4x)$

C $f'(x) = -16\sin(4x)$

D $f'(x) = -4\sin(4x)$

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Advanced Derivative Rules - Practice

13 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$\frac{d}{dx}\cos(u) = -\sin(u)\cdot\frac{du}{dx}$$
$$[12pt] f(x) = 2\cos(x^4)$$

A
$$f'(x) = -2\sin(x^4)$$

B
$$f'(x) = -2\sin(x^4)\cdot(x^4)$$

C
$$f'(x) = -2\sin(x^4)\cdot 4x^3$$

D
$$f'(x) = 2\cos(x^4)\cdot 4x^3$$

14 Find the derivative f'(x) using the trigonometric rules and the chain rule.

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

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

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

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

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

15 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$\frac{d}{dx}\cos(u) = -\sin(u)\cdot\frac{du}{dx}$$
$$[12pt] f(x) = 2\cos\left(\frac{2}{x^3}\right)$$

A
$$f'(x) = -2\sin\left(\frac{2}{x^3}\right)\cdot\left(-\frac{6}{x^4}\right)$$

B
$$f'(x) = 2\cos\left(\frac{2}{x^3}\right)\cdot\left(-\frac{6}{x^4}\right)$$

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

D
$$f'(x) = -2\sin\left(\frac{2}{x^3}\right)\cdot(\frac{2}{x^3})$$

16 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$f(x) = 3\cos\left(\frac{1}{x^3}\right)$$

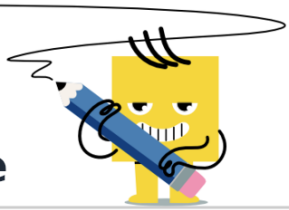
A
$$f'(x) = -3\sin\left(\frac{1}{x^3}\right)\cdot\left(-\frac{3}{x^4}\right)$$

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

C
$$f'(x) = -3\sin\left(\frac{1}{x^3}\right)\cdot(\frac{1}{x^3})$$

D
$$f'(x) = 3\cos\left(\frac{1}{x^3}\right)\cdot\left(-\frac{3}{x^4}\right)$$

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Advanced Derivative Rules - Practice

17 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$\frac{d}{dx}\sin(u) = \cos(u) \cdot \frac{du}{dx}$$

$$[12pt] f(x) = 3\sin\left(\frac{3}{\sqrt{x}}\right)$$

A $$f'(x) = 3\cos\left(\frac{3}{\sqrt{x}}\right)$$

B $$f'(x) = 3\cos\left(\frac{3}{\sqrt{x}}\right) \cdot \left(\frac{3}{\sqrt{x}}\right)$$

C $$f'(x) = 3\cos\left(\frac{3}{\sqrt{x}}\right) \cdot \left(-\frac{3}{\sqrt{x^3}}\right)$$

D $$f'(x) = 3\sin\left(\frac{3}{\sqrt{x}}\right) \cdot \left(-\frac{3}{\sqrt{x^3}}\right)$$

18 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$f(x) = 4\sin\left(2\sqrt{x}\right)$$

A $$f'(x) = 4\cos\left(2\sqrt{x}\right)$$

B $$f'(x) = 4\sin\left(2\sqrt{x}\right) \cdot \frac{1}{\sqrt{x}}$$

C $$f'(x) = 4\cos\left(2\sqrt{x}\right) \cdot \left(2\sqrt{x}\right)$$

D $$f'(x) = 4\cos\left(2\sqrt{x}\right) \cdot \frac{1}{\sqrt{x}}$$

19 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$\frac{d}{dx}\cos(u) = -\sin(u) \cdot \frac{du}{dx}$$

$$[12pt] f(x) = 5\cos\left(2x^3 - x^2\right)$$

A $$f'(x) = -5\sin\left(2x^3 - x^2\right) \cdot \left(2x^3 - x^2\right)$$

B $$f'(x) = -5\sin\left(2x^3 - x^2\right)$$

C $$f'(x) = 5\cos\left(2x^3 - x^2\right) \cdot \left(6x^2 - 2x\right)$$

D $$f'(x) = -5\sin\left(2x^3 - x^2\right) \cdot \left(6x^2 - 2x\right)$$

20 Find the derivative f'(x) using the product, chain, and natural exponential rules.

$$\frac{d}{dx}e^x = e^x$$

$$[12pt] f(x) = \sqrt[3]{(2x+5)}\,(4e^x)$$

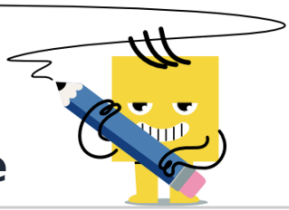
A $$f'(x) = \frac{2}{3}(2x+5)^{-\frac{2}{3}}(4e^x)$$

B $$f'(x) = \sqrt[3]{(2x+5)}\,(4e^x)$$

C $$f'(x) = \frac{2}{3}(2x+5)^{-\frac{2}{3}}(4e^x) + \sqrt[3]{(2x+5)}\,(4e^x)$$

D $$f'(x) = \frac{2}{3}(2x+5)^{-\frac{2}{3}}(4e^x) - \sqrt[3]{(2x+5)}\,(4e^x)$$

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Advanced Derivative Rules - Practice

21 Find the derivative f'(x) using the trigonometric rules and the chain rule.

$$f(x) = 3\cos\left(x^4 - x^3\right)$$

A $f'(x) = -3\sin\left(x^4 - x^3\right) \cdot \left(4x^3 - 3x^2\right)$

B $f'(x) = -3\sin\left(x^4 - x^3\right) \cdot \left(x^4 - x^3\right)$

C $f'(x) = -3\sin\left(x^4 - x^3\right)$

D $f'(x) = 3\cos\left(x^4 - x^3\right) \cdot \left(4x^3 - 3x^2\right)$

22 Find the derivative f'(x) using the product, chain, and natural exponential rules.

$$f(x) = (2x-2)^4\left(5e^x\right)$$

A $f'(x) = (2x-2)^4\left(5e^x\right)$

B $f'(x) = 8(2x-2)^3\left(5e^x\right) - (2x-2)^4\left(5e^x\right)$

C $f'(x) = 8(2x-2)^3\left(5e^x\right)$

D $f'(x) = 8(2x-2)^3\left(5e^x\right) + (2x-2)^4\left(5e^x\right)$

23 Find the derivative f'(x) using the product, chain, and general exponential rules.

$$\frac{d}{dx}a^x = a^x \ln a$$

$$[12pt] f(x) = (x+2)^{\frac{1}{3}}\left(3 \cdot 9^x\right)$$

A $f'(x) = \frac{1}{3}(x+2)^{-\frac{2}{3}}\left(3 \cdot 9^x\right)$

B $f'(x) = (x+2)^{\frac{1}{3}}\left(3 \cdot 9^x \ln 9\right)$

C $f'(x) = \frac{1}{3}(x+2)^{-\frac{2}{3}}\left(3 \cdot 9^x \ln 9\right)$

D $f'(x) = \frac{1}{3}(x+2)^{-\frac{2}{3}}\left(3 \cdot 9^x\right) + (x+2)^{\frac{1}{3}}\left(3 \cdot 9^x \ln 9\right)$

24 Find the derivative f'(x) using the quotient, chain, and natural exponential rules.

$$\text{if } h(x) = \frac{f(x)}{g(x)},\ h'(x) = \frac{f'(x)\,g(x) - f(x)\,g'(x)}{[g(x)]^2}$$

$$[12pt] f(x) = \frac{(3x^2-5)^{\frac{1}{3}}}{4e^x}$$

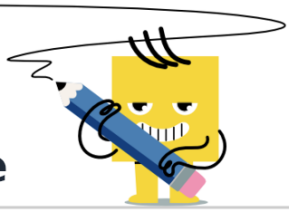
A $f'(x) = \frac{\frac{1}{3}(3x^2-5)^{-\frac{2}{3}}(6x)\left(4e^x\right) - (3x^2-5)^{\frac{1}{3}}\left(4e^x\right)}{4e^x}$

B $f'(x) = \frac{(3x^2-5)^{\frac{1}{3}}\left(4e^x\right) - \frac{1}{3}(3x^2-5)^{-\frac{2}{3}}(6x)\left(4e^x\right)}{\left(4e^x\right)^2}$

C $f'(x) = \frac{\frac{1}{3}(3x^2-5)^{-\frac{2}{3}}(6x)\left(4e^x\right) + (3x^2-5)^{\frac{1}{3}}\left(4e^x\right)}{\left(4e^x\right)^2}$

D $f'(x) = \frac{\frac{1}{3}(3x^2-5)^{-\frac{2}{3}}(6x)\left(4e^x\right) - (3x^2-5)^{\frac{1}{3}}\left(4e^x\right)}{\left(4e^x\right)^2}$

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Advanced Derivative Rules - Practice

25 Find the derivative f'(x) using the product, chain, and general exponential rules.

$$f(x) = \frac{1}{(2x+5)}(3 \cdot 8^x)$$

A

$$f'(x) = -2(2x+5)^{-2}(3 \cdot 8^x)$$

B

$$f'(x) = -2(2x+5)^{-2}(3 \cdot 8^x \ln 8)$$

C

$$f'(x) = \frac{1}{(2x+5)}(3 \cdot 8^x \ln 8)$$

D

$$f'(x) = -2(2x+5)^{-2}(3 \cdot 8^x) + \frac{1}{(2x+5)}(3 \cdot 8^x \ln 8)$$

26 Find the derivative f'(x) using the product, chain, and trigonometric rules.

$$\text{if } y = f(g(x)),\ y' = f'(g(x)) \cdot g'(x)$$

$$[12pt] f(x) = \frac{1}{(3x^2-4)^2}(\sin(x))$$

A

$$f'(x) = -2(3x^2-4)^{-3}(6x)(\sin(x))$$

B

$$f'(x) = -2(3x^2-4)^{-3}(6x)(\cos(x))$$

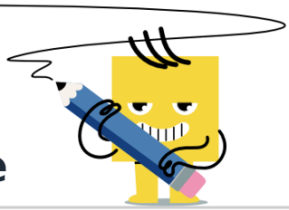
C

$$f'(x) = -2(3x^2-4)^{-3}(6x)(\sin(x)) + \frac{1}{(3x^2-4)^2}(\cos(x))$$

D

$$f'(x) = \frac{1}{(3x^2-4)^2}(\cos(x))$$

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Advanced Derivative Rules - Practice

27 Find the derivative f'(x) using the product, chain, and trigonometric rules.

$$f(x) = (2x^2+5)^{-1}\,(4\cos(x))$$

A $$f'(x) = -(2x^2+5)^{-2}(4x)\,(-4\sin(x))$$

B $$f'(x) = (2x^2+5)^{-1}\,(-4\sin(x))$$

C $$f'(x) = -(2x^2+5)^{-2}(4x)\,(4\cos(x)) + (2x^2+5)^{-1}\,(-4\sin(x))$$

D $$f'(x) = -(2x^2+5)^{-2}(4x)\,(4\cos(x))$$

28 Find the derivative f'(x) using the quotient, chain, and natural exponential rules.

$$f(x) = \frac{(x+5)^3}{4e^x}$$

A $$f'(x) = \frac{3(x+5)^2\,(4e^x) + (x+5)^3\,(4e^x)}{(4e^x)^2}$$

B $$f'(x) = \frac{(x+5)^3\,(4e^x) - 3(x+5)^2\,(4e^x)}{(4e^x)^2}$$

C $$f'(x) = \frac{3(x+5)^2\,(4e^x) - (x+5)^3\,(4e^x)}{(4e^x)^2}$$

D $$f'(x) = \frac{3(x+5)^2\,(4e^x) - (x+5)^3\,(4e^x)}{4e^x}$$

29 Find the derivative f'(x) using the quotient, chain, and general exponential rules.

$$\text{if } y = f(g(x)),\ y' = f'(g(x)) \cdot g'(x)$$

$$[12pt] f(x) = \frac{(x-2)^2}{4 \cdot 7^x}$$

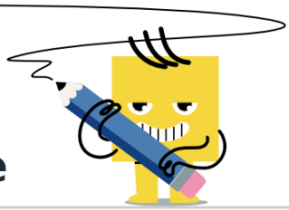
A $$f'(x) = \frac{(x-2)^2\,(4 \cdot 7^x \ln 7) - 2(x-2)\,(4 \cdot 7^x)}{(4 \cdot 7^x)^2}$$

B $$f'(x) = \frac{2(x-2)\,(4 \cdot 7^x) - (x-2)^2\,(4 \cdot 7^x \ln 7)}{(4 \cdot 7^x)^2}$$

C $$f'(x) = \frac{2(x-2)\,(4 \cdot 7^x) - (x-2)^2\,(4 \cdot 7^x \ln 7)}{4 \cdot 7^x}$$

D $$f'(x) = \frac{2(x-2)\,(4 \cdot 7^x) + (x-2)^2\,(4 \cdot 7^x \ln 7)}{(4 \cdot 7^x)^2}$$

Name



Advanced Derivative Rules - Practice

30 Find the derivative f'(x) using the quotient, chain, and general exponential rules.

$$f(x) = \frac{\sqrt[3]{(2x^2+4)}}{5 \cdot 3^x}$$

A
$$f'(x) = \frac{\frac{1}{3}(2x^2+4)^{-\frac{2}{3}}(4x)(5 \cdot 3^x) + \sqrt[3]{(2x^2+4)}(5 \cdot 3^x \ln 3)}{(5 \cdot 3^x)^2}$$

B
$$f'(x) = \frac{\frac{1}{3}(2x^2+4)^{-\frac{2}{3}}(4x)(5 \cdot 3^x) - \sqrt[3]{(2x^2+4)}(5 \cdot 3^x \ln 3)}{(5 \cdot 3^x)^2}$$

C
$$f'(x) = \frac{\frac{1}{3}(2x^2+4)^{-\frac{2}{3}}(4x)(5 \cdot 3^x) - \sqrt[3]{(2x^2+4)}(5 \cdot 3^x \ln 3)}{5 \cdot 3^x}$$

D
$$f'(x) = \frac{\sqrt[3]{(2x^2+4)}(5 \cdot 3^x \ln 3) - \frac{1}{3}(2x^2+4)^{-\frac{2}{3}}(4x)(5 \cdot 3^x)}{(5 \cdot 3^x)^2}$$

31 Find the derivative f'(x) using the quotient, chain, and trigonometric rules.

$$\text{if } h(x) = \frac{f(x)}{g(x)},\ h'(x) = \frac{f'(x)\,g(x) - f(x)\,g'(x)}{[g(x)]^2}$$

$$[12pt] f(x) = \frac{(x^2-2)^{-2}}{3\cos(x)}$$

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

B
$$f'(x) = \frac{-2(x^2-2)^{-3}(2x)(3\cos(x)) + (x^2-2)^{-2}(-3\sin(x))}{(3\cos(x))^2}$$

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

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