This is a fake quiz, this is only a fake quiz. In the event of an actual quiz, you'd have been given fair warning. Repeat: This is only a fake quiz.

1. Let $f(x) = \sqrt{x} \cdot e^x$. What is $f'(x)$?

   Product Rule!

   $$f'(x) = \frac{1}{2}x^{-1/2} \cdot e^x + \underline{} \cdot e^x \quad or \quad \frac{1}{2\sqrt{x}} \cdot e^x + \sqrt{x} \cdot e^x$$

2. Let $f(x) = \cos x \cdot \sin x$. What is $f'(x)$?

   $\underline{}$ *Rule!*

   $$f'(x) = -\sin x \cdot \sin x + \cos x \cdot \cos x$$
   $$= -\sin^2 x + \cos^2 x$$

3. Let $f(x) = \frac{\cos x}{\sin x}$. What is $f'(x)$?

   Rule!

   $$f'(x) = \frac{-\sin x \cdot \sin x \quad \cos x \cdot \cos x}{} = \frac{-\sin^2 x - \cos^2 x}{\sin^2 x} = \frac{-1}{\sin^2 x}$$

4. Let $f(x) = \frac{e^x}{x^3}$. What is $f'(x)$?

   Quotient Rule!

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

5. Let $f(x) = \frac{1}{(\sin x)^3}$. What is $f'(x)$?

   $f(x) = (\sin x)^{-3}$ *Chain Rule!*

   $$f'(x) = -3(\sin x)^{-4} \cdot \underline{} = \frac{-3\cos x}{\sin^4 x}$$

6. Let $f(x) = \sqrt{16 - x^4}$ What is $f'(x)$? *Chain Rule!*

   $$f(x) = (16 - x^4)$$
   $$f'(x) = \frac{1}{2}(16 - x^4) \cdot \underline{} = \frac{-2x^3}{\sqrt{16 - x^4}}$$

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1. Let $f(x) = \sqrt{x} \cdot e^x$. What is $f'(x)$?

Product Rule!

$$f'(x) = \frac{1}{2}x^{-1/2} \cdot e^x + x^{1/2} \cdot e^x \qquad \text{or} \qquad \frac{1}{2\sqrt{x}} \cdot e^x + \sqrt{x} \cdot e^x$$

2. Let $f(x) = \cos x \cdot \sin x$. What is $f'(x)$?

Product Rule!

$$f'(x) = -\sin x \cdot \sin x + \cos x \cdot \cos x$$
$$= -\sin^2 x + \cos^2 x$$

3. Let $f(x) = \frac{\cos x}{\sin x}$. What is $f'(x)$?

Quotient Rule!

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

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Quotient Rule!

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

5. Let $f(x) = \frac{1}{(\sin x)^3}$. What is $f'(x)$?

$$f(x) = (\sin x)^{-3} \qquad \textit{Chain Rule!}$$
$$f'(x) = -3(\sin x)^{-4} \cdot \cos x = \frac{-3\cos x}{\sin^4 x}$$

6. Let $f(x) = \sqrt{16 - x^4}$ What is $f'(x)$? *Chain Rule!*

$$f(x) = (16 - x^4)^{1/2}$$
$$f'(x) = \frac{1}{2}(16 - x^4)^{-1/2} \cdot -4x^3 = \frac{-2x^3}{\sqrt{16 - x^4}}$$