Choose the 3 conditions that must be satisfied for a function to be continuous at a point:

A. $\lim_{x \to a} f(x) \neq f(a)$

B. $\lim_{x \to a} f(x) = f(a)$

C. $\lim_{x \to a} f(x)$ exists.

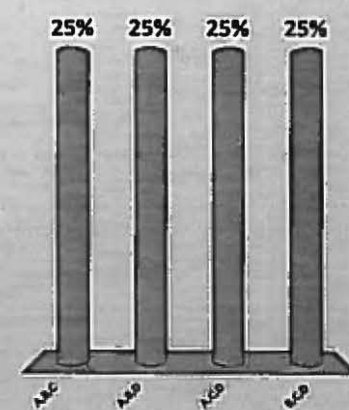
D. $f(a)$ is defined.

A. A,B,C

B. A,B,D

C. A,C,D

D. B,C,D



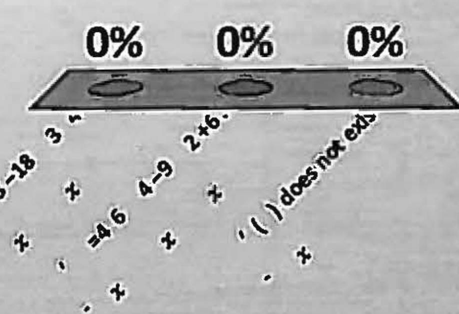
Let $\overset{y}{f}(x) = (\overbrace{6x^4 - 9x^2 + 6}^{u=g(x)})^4$. Find $f'(x)$.

$$\underbrace{f'(x)}_{\frac{dy}{dx}} = \underbrace{4(6x^4 - 9x^2 + 6)^3}_{\frac{dy}{du}}\underbrace{(24x^3 - 18x)}_{\frac{du}{dx}}$$

A. $f'(x) = (24x^3 - 18x)^3(4x)^3$

B. $f'(x) = 4(6x^4 - 9x^2 + 6)^3(24x^3 - 18x)$

C. $f'(x)$ does not exist



Let $g(x) = 4\sqrt{4x^2 + 3}$. Find $g'(x)$.

$u = g(x)$

$g'(x) = 4\left(\frac{1}{2}(4x^2+3)^{-1/2}\right)(8x)$

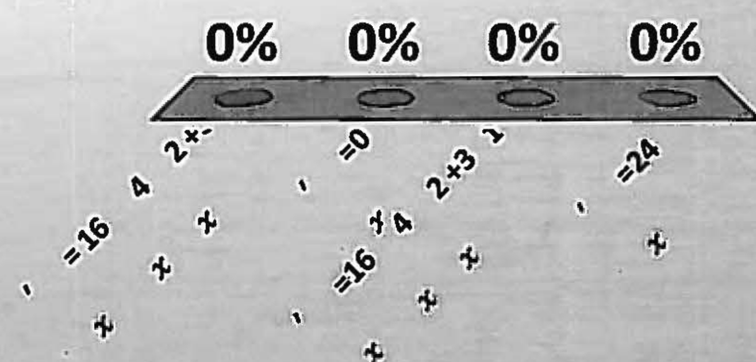
$= 16(4x^2+3)^{-1/2}$

A. $g'(x) = \dfrac{16x}{\sqrt{4x^2+3}}$

B. $g'(x) = 0$

C. $g'(x) = 16x(4x^2 + 3)^{\frac{1}{2}}$

D. $g'(x) = 24x$



$$u=g(x)$$

Let $f(x) = 2e^{5x+1}$. Find $f'(x)$.

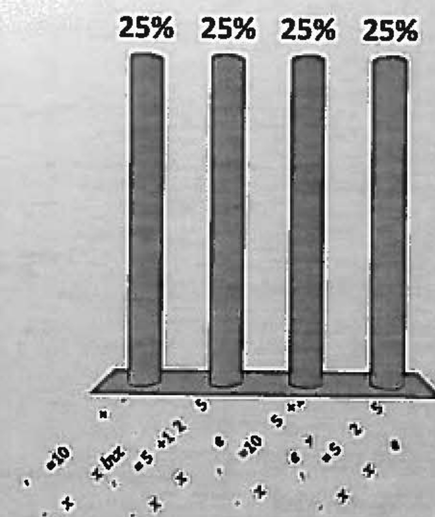
$$f'(x) = 2e^{5x+1} \cdot 5$$

A. $f'(x) = 10x(lnx) + e^5$

B. $f'(x) = (5x+1)(2)e^{5x}$

C. $f'(x) = 10(e^{5x+1})$

D. $f'(x) = (5x)(2)e^{5x}$



Let $f(x) = \ln(4 - 3x)$. Find $f'(x)$.

$u = g(x)$

$$f'(x) = \frac{1}{4-3x} \cdot (-3)$$

$$\boxed{= \frac{-3}{4-3x}}$$

Chain Rule Twice:

$u=\sqrt{x}$ $\quad$ $v=x+7$

$y=\ln(u)$

Let $f(x) = ln\sqrt{x+7}$. Find $f'(x)$.

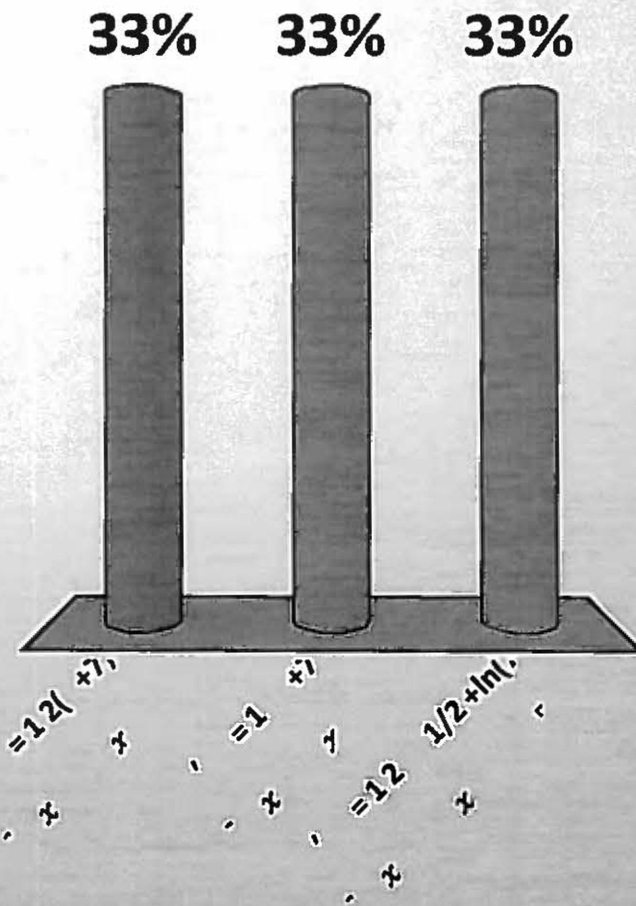
$$\overset{\frac{dy}{dx}}{f'(x)} = \overset{\frac{dy}{du}}{\frac{1}{\sqrt{x+7}}} \cdot \overset{\frac{du}{dv}}{\frac{1}{2}(x+7)^{-1/2}} \cdot \overset{\frac{dv}{dx}}{(1)}$$

$$= \frac{1}{\sqrt{x+7}} \cdot \frac{1}{2\sqrt{x+7}}$$

A. $f'(x) = \dfrac{1}{2(x+7)}$

B. $f'(x) = \dfrac{1}{\sqrt{x+7}}$

C. $f'(x) = \dfrac{1}{2}x^{1/2} + \ln(7)$

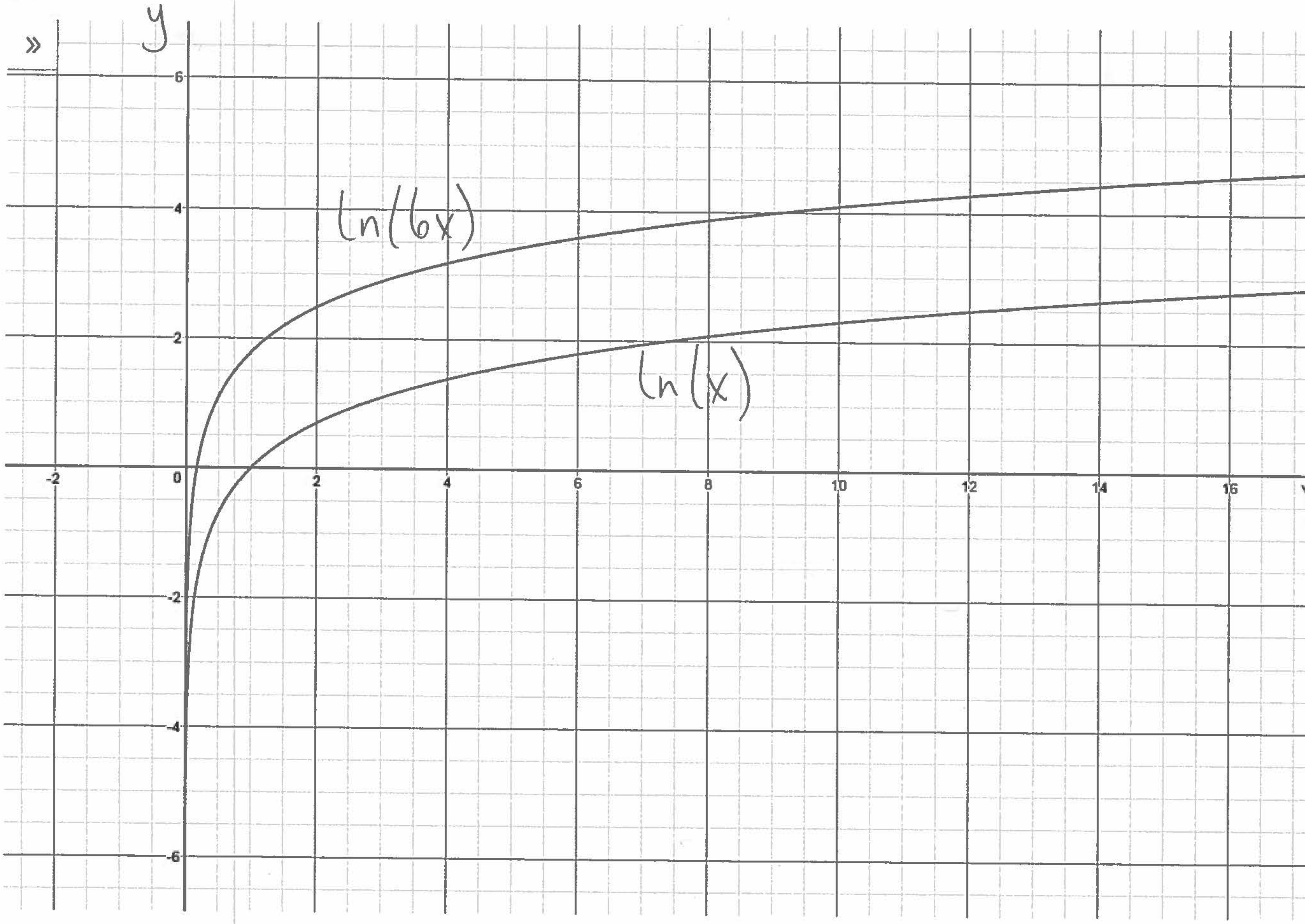


QUESTION:

- *A friend concludes that because* $y = \ln(6x)$ *and* $y = \ln(x)$ *both have the same derivative, namely* $\frac{dy}{dx} = \frac{1}{x}$*, then these two functions must be the same.*

- *Is your friend correct? Why or why not?*

No. It is possible for more than one function to have the same slope everywhere (see the next page).



https://www.desmos.com/calculator

QUESTION:

- If $f(t)$ give the number of units of a certain product sold by a company after t days and $g(x)$ gives the revenue (in dollars) from the sale of x units of the company's products, what does $(g \circ f)'(t)$ describe?

Since $(g \circ f)(t)$ is a function of t, call it h. So

$h(t) = (g \circ f)(t) =$ revenue (in dollars) after t days

$\Rightarrow h'(t) = (g \circ f)'(t) = \boxed{\text{marginal revenue after } t \text{ days.}}$