Quiz 6

ⓘ This is a preview of the published version of the quiz

Started: Oct 11 at 8:59am

Quiz Instructions

Choose the best solution choice each problem. Each problem is worth one (1) or two (2) points.

Question 1 — 1 pts

IF you were asked to find the derivative of $f(x) = \log_7[(6x^4+3)^5]$, it would be helpful to rewrite the expression first.

Which expression below is equivalent to the original expression for $f(x)$? DO NOT DIFFERENTIATE.

$f(x) = 5 \log_7 (6x^4+3)$

$= \frac{5}{\ln 7} \ln (6x^4+3)$

- ○ $f(x) = 5\ \log_7(6x^4) + 5\ \log_7(3)$
- ○ $f(x) = 5\ \ln(6x^4+3)$
- X $f(x) = \dfrac{5\ \ln(6x^4+3)}{\ln 7}$
- ○ $f(x) = \log_7 6x^{20} + \log_7 3^5$

Question 2 — 2 pts

Use logarithmic differentiation to compute $\frac{dy}{dx}$ when $y = x^{\sqrt{x}}$.

Which of these is a correct step in the process?

$\ln y = \ln x^{\sqrt{x}}$

$\ln y = \sqrt{x} \ln x$

$\frac{d}{dx} \ln y = \frac{d}{dx} (\sqrt{x} \ln x)$

$\frac{1}{y} \cdot \frac{dy}{dx} = \frac{d}{dx} (\sqrt{x} \ln x)$

⋮

- ○ $y = \sqrt{x}\ \ln x$
- X $\dfrac{1}{y}\dfrac{dy}{dx} = \dfrac{d}{dx}(\sqrt{x}\ \ln x)$
- ○ $\dfrac{1}{y}\dfrac{dy}{dx} = \dfrac{\ln x}{\sqrt{x}}$
- ○ $\ln y = x^{\sqrt{x}}$

Question 3

2 pts

Find $\frac{dy}{dx}$ when $y = 2^{4x} + 4x^2$.

$$\frac{dy}{dx} = 2^{4x} \cdot 4 \cdot \ln 2 + 8x$$

- ○ $\frac{dy}{dx} = 8x + 2^{4x} \cdot 4$
- ○ $\frac{dy}{dx} = 8x + 16^x \cdot \ln(2)$
- ○ $\frac{dy}{dx} = 4x \cdot 2^{4x-1} + 8x$
- X $\frac{dy}{dx} = 2^{4x} \cdot 4 \cdot \ln(2) + 8x$

In general,

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

Question 4

1 pts

IF you were asked to find the derivative of $g(x) = e^{3 \ln x}$, it would be helpful to rewrite the expression first.

Which expression below is equivalent to the original expression for $g(x)$? DO NOT DIFFERENTIATE.

- X $g(x) = x^3$
- ○ $g(x) = x\,e^{x^3}$
- ○ $g(x) = 3^x$
- ○ $g(x) = \ln(x^3)$

$$g(x) = e^{3 \ln x} = e^{\ln x^3} = x^3$$

Question 5

2 pts

Let $f(x) = x^3 + 2x + 3$. Find $f^{-1}(0)$ and then find $(f^{-1})'(0)$.

- X $f^{-1}(0) = -1$ and $(f^{-1})'(0) = \frac{1}{5}$
- ○ $f^{-1}(0) = 0$ and $(f^{-1})'(0) = \frac{1}{3}$

$f^{-1}(0) = u \Leftrightarrow f(u) = 0$

$u^3 + 2u + 3 = 0 \Rightarrow u = -1$

$f^{-1}(0) = -1$

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○ $f^{-1}(0) = -1$ and $(f^{-1})'(0) = 5$

○ $f^{-1}(0) = -1$ and $(f^{-1})'(0) = \frac{1}{3}$

$$(f^{-1})'(0) = \frac{1}{f'(f^{-1}(0))} = \frac{1}{f'(-1)} = \frac{1}{5}$$

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

Question 6

2 pts

Find $\frac{dy}{dx}$ when $y = \cos^{-1}(x^2)$.

(The function in the problem is the inverse cosine, not the reciprocal of the cosine.)

○ $\frac{dy}{dx} = \frac{-1}{\sqrt{1-x^4}}$

○ $\frac{dy}{dx} = -2x\sin^{-1}(x^2)$

○ $\frac{dy}{dx} = \frac{-2x}{\sqrt{1-x^2}}$

X $\frac{dy}{dx} = \frac{-2x}{\sqrt{1-x^4}}$

$$\frac{dy}{dx} = \frac{-1}{\sqrt{1-(x^2)^2}} \cdot \frac{d}{dx}(x^2)$$

$$= \frac{-2x}{\sqrt{1-x^4}}$$

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