

Name: _____ Worksheet 11/29/18 BC CAL

1) The graph of $f(x) = \frac{x^3}{e^{2x}}$ has how many points of inflection?
 A) 1 B) 2 C) 3 D) 4

2) What is the slope of the tangent to the graph of $f(x) = \ln(\cos x)$ at $x = \frac{\pi}{3}$?
 A) $\sqrt{3}$ B) $-\frac{\sqrt{3}}{3}$ C) $-\frac{\sqrt{3}}{3}$ D) $\frac{\sqrt{3}}{3}$

3) The function, $f(x) = \ln x - x$, is increasing for
 A) $0 < x \leq e$ B) $x \geq 1$ C) $x > 0$ D) $0 < x \leq 1$

4) If $f(x) = xe^{-x}$, then $f'(1) =$
 A) $\frac{1}{e}$ B) $2e^{-1}$ C) 0 D) e

Handwritten work for problem 4:
 $u = x, v = e^{-x}$
 $u' = 1, v' = -e^{-x}$
 $e^{-x} - xe^{-x} \rightarrow e^{-1} - 1e^{-1} = \frac{1}{e} - \frac{1}{e} = 0$

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5) If $f(x) = e^{\frac{1}{x^2}}$, then $f'(x) =$
 A) $e^{\frac{1}{x^2}}$ B) $\frac{1}{x^2} e^{\frac{1}{x^2}}$ C) $\frac{1}{x^3} e^{\frac{1}{x^2}}$ D) $-\frac{1}{x^3} e^{\frac{1}{x^2}}$

6) If $f(x) = e^{\cos x}$, then $f'(x) =$
 A) $e^{\cos x} (\sin^2 x - \cos x)$ B) $e^{\cos x} (\sin^2 x - \cos^2 x)$ C) $e^{\cos x} (\cos x - \sin^2 x)$ D) $-\sin x e^{\cos x}$

14) If $f(x) = \sec^{-1}(x^2)$, then $f'(x) =$
 A) $\frac{2}{x^2 \sqrt{x^2 - 1}}$ B) $\frac{2x}{x^4 + 1}$ C) $\frac{2x}{x^4 - 1}$ D) $\frac{2}{x(x^2 - 1)}$

15) Find $\frac{dy}{dx}$ for the given function
 $y = \cos^{-1}(3x^2)$

Handwritten work for problem 15:
 $u = 3x^2, u' = 6x$
 $\frac{-6x}{\sqrt{1 - 9x^2}} = \frac{-6x}{\sqrt{1 - 9x^2}}$

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Questions 7 through 9 refer to the following:
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7) $g(x) = e^{-\frac{1}{x^2}}$ Find the derivative of the given function.
 $u = -x^{-2}, u' = 2x^{-3} \cdot \frac{2}{x^3}$
 $2e^{-\frac{1}{x^2}} \cdot \frac{2}{x^3}$

8) $y = (\ln x)^3$
 $3(\ln x)^2 \cdot \frac{1}{x} = \frac{3 \ln^2 x}{x}$

9) $f(x) = \ln |\sin x|$
 $u = \sin x, u' = \cos x$
 $\frac{\cos x}{\sin x} = \tan x$

10) $\frac{d}{dx} \left[\frac{f(x^2 + 1)}{x} \right] =$
 A) $(2x) \frac{f(x^2 + 1)}{x^2}$ B) $(x^2 + 1) \frac{f(x^2 + 1)}{x^2}$ C) $\frac{f(x^2 + 1)}{x^2} \ln 5$ D) $2x (\ln 5) \frac{f(x^2 + 1)}{x^2}$

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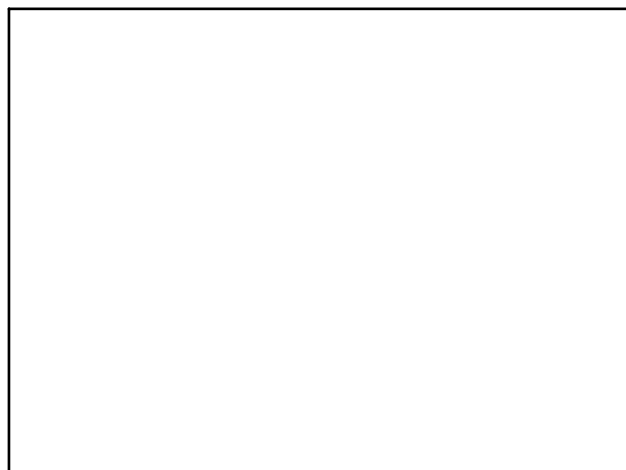
11) If $y = 2^{-x}$, then $\frac{dy}{dx} =$
 A) $2^{-x} \ln 2$ B) 2^{-x-1} C) $-\frac{\ln 2}{2^x}$ D) $x 2^{(x-1)}$

12) $\frac{d}{dx} \left[\tan^{-1} \left(\frac{x}{2} \right) \right] =$
 A) $\frac{1}{2+x^2}$ B) $\frac{4}{4+x^2}$ C) $\frac{2}{4+x^2}$ D) $\frac{2}{2+x^2}$

13) If $y = \text{Arc cos} \left(\frac{2x}{3} \right)$, then $\frac{dy}{dx} =$
 A) $-\frac{1}{3\sqrt{9-4x^2}}$ B) $-\frac{2}{3\sqrt{9-4x^2}}$ C) $\frac{2}{\sqrt{9-4x^2}}$ D) $-\frac{2}{9\sqrt{9-4x^2}}$

Handwritten work for problem 13:
 $u = \frac{2x}{3}, u' = \frac{2}{3}$
 $\frac{-2}{3\sqrt{1 - \frac{4x^2}{9}}} = \frac{-2}{3\sqrt{\frac{9-4x^2}{9}}} = \frac{-2}{\sqrt{9-4x^2}}$

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