Unit 2 AP Classroom Practice for Sections 6-9

1) $\lim_{x \to 0} \frac{5^x - 1}{x} =$

(A) 0

(B) $\ln 5$

(C) $5 \ln 5$

(D) 1

2) If $f(x) = \ln x$, then $\lim_{x \to 2} \frac{f(2) - f(x)}{x - 2} =$

(A) $-\ln 2$

(B) $-\frac{1}{2}$

(C) $\frac{1}{2}$

(D) $\ln 2$

3) Let f be the function given by $f(x) = 2\cos x + 3e^x$. What is the value of $f'(0)$?

(A) -3

(B) 0

(C) 3

(D) 5

4) If $f(x) = e^x \sin x$, then $f'(x) =$

(A) $e^x \cos x$

(B) $-e^x \cos x$

(C) $e^x(\sin x + \cos x)$

(D) $e^x(\sin x - \cos x)$

5) If $f(x) = \ln x \cos x$, then $f'(x) =$

(A) $-\frac{\sin x}{x}$

(B) $\frac{\sin x}{x}$

(C) $\frac{\cos x}{x} - \ln x \sin x$

(D) $\frac{\cos x}{x} + \ln x \sin x$

6) If $f(x) = \frac{\cos x}{\ln x}$, then $f'(x) =$

(A) $\frac{x \sin x \ln x - \cos x}{x(\ln x)^2}$

(B) $\frac{-x \sin x \ln x - \cos x}{x(\ln x)^2}$

(C) $-x \sin x$

(D) $\frac{-x \sin x \ln x + \cos x}{x(\ln x)^2}$

7) If $f(x) = \frac{\sin x}{e^x}$, then $f'(x) =$

(A) $\frac{-\cos x - \sin x}{e^x}$

(B) $\frac{\cos x - \sin x}{e^x}$

(C) $\frac{\sin x - \cos x}{e^x}$

(D) $\frac{\cos x + \sin x}{e^x}$

8) If $f(x) = \left(\cos\left(\sqrt{x}\right) - \ln\left(x^2\right)\right)^3$, then $f'(x) =$

(A) $3\left(-\frac{1}{2\sqrt{x}}\sin\left(\sqrt{x}\right) - \frac{2}{x}\right)^2$

(B) $3\left(\cos\left(\sqrt{x}\right) - \ln\left(x^2\right)\right)^2 \cdot \left(-\sin\left(\sqrt{x}\right) - \frac{1}{x^2}\right)$

(C) $3\left(\cos\left(\sqrt{x}\right) - \ln\left(x^2\right)\right)^2 \cdot \left(\frac{1}{2\sqrt{x}}\cos\left(\sqrt{x}\right) - \frac{2}{x}\right)$

(D) $3\left(\cos\left(\sqrt{x}\right) - \ln\left(x^2\right)\right)^2 \cdot \left(-\frac{1}{2\sqrt{x}}\sin\left(\sqrt{x}\right) - \frac{2}{x}\right)$

9) If $f(x) = \left(e^{3x} + \sin(2x)\right)^4$, then $f'(x) =$

(A) $4\left(3e^{3x} + 2\cos(2x)\right)^3$

(B) $4\left(e^{3x} + \sin(2x)\right)^3 \left(e^{3x} + \cos(2x)\right)$

(C) $4\left(e^{3x} + \sin(2x)\right)^3 \left(3e^{3x} + 2\sin(2x)\right)$

(D) $4\left(e^{3x} + \sin(2x)\right)^3 \left(3e^{3x} + 2\cos(2x)\right)$

10) Let f be the function defined by $f(x) = e^{h(x)}$, where h is a differentiable function. Which of the following is equivalent to the derivative of f with respect to x ?

(A) $e^{h(x)}$

(B) $e^{h'(x)}$

(C) $h'(x)e^{h(x)}$

(D) $h(x)e^{h(x)-1}$

11) If $e^{2y} - e^{(y^2-y)} = x^4 - x^2$, then the value of $\frac{dy}{dx}$ at the point $(1, 0)$ is

(A) 0

(B) $\frac{1}{2}$

(C) $\frac{2}{3}$

(D) 2

12) If $y = \ln(2x^2 - 3y^2)$, then $\frac{dy}{dx} =$

(A) $\frac{1}{2x^2-3y^2}$

(B) $\frac{4x}{2x^2-3y^2}$

(C) $\frac{4x-6y}{2x^2-3y^2}$

(D) $\frac{4x}{2x^2-3y^2+6y}$

13) If $2xy^2 - 3x^2y = 6x$, then $\frac{dy}{dx} =$

(A) $\frac{6}{4y-6x}$

(B) $\frac{2y^2-2xy-6}{3x^2}$

(C) $\frac{-2y^2+6xy+6}{4xy-3x^2}$

(D) $\frac{-2y^2+6xy+3x^2+6}{4xy}$

14) If $f(x) = \arcsin x$, then $\lim_{x \to \frac{1}{2}} \frac{f(x)-f(\frac{1}{2})}{x-\frac{1}{2}}$ is

(A) 0

(B) $\frac{\pi}{6}$

(C) $\frac{2}{\sqrt{3}}$

(D) nonexistent

15) $\frac{d}{dx}\left(\csc^{-1}\left(e^{x}\right)\right) =$

(A) $-e^{x} \cdot \cot\left(e^{x}\right) \cdot \csc\left(e^{x}\right)$

(B) $e^{x} \cdot \cot\left(e^{x}\right) \cdot \csc^{3}\left(e^{x}\right)$

(C) $\frac{e^{x}}{\sqrt{1-e^{2x}}}$

(D) $\frac{-1}{e^{x}\sqrt{1-\left(\frac{1}{e^{2x}}\right)}}$

16) $\frac{d}{dx}\left(\tan^{-1}\left(3x\right)\right) =$

(A) $3\sec^{2}\left(3x\right)$

(B) $-3\csc^{2}\left(3x\right)$

(C) $\frac{3}{\sqrt{1-(3x)^{2}}}$

(D) $\frac{3}{1+(3x)^{2}}$

17) Which of the following could be used to find the slope of the line tangent to the curve $\tan^{-1}(x-2y+2) = x^2 - 3y + \tan^{-1}(2) - 1$?

(A) $\frac{1}{1+(x-2y+2)^2} = 2x - 3\frac{dy}{dx}$

(B) $\frac{-1}{1+(x-2y+2)^2} = 2x - 3$

(C) $\frac{1-2\frac{dy}{dx}}{1+(x-2y+2)^2} = 2x - 3\frac{dy}{dx}$

(D) $\frac{1-2\frac{dy}{dx}}{1+(x-2y+2)} = 2x - 3\frac{dy}{dx}$

18) Which of the following does not require the use of the chain rule to find $\frac{dy}{dx}$?

(A) $y = \sin^{-1}(3x^2 - 4)$

(B) $3x^6 - 4y^2 = 2xy^5 + 7$

(C) $y = 3x^2 - \sqrt{x} + \frac{2}{x}$

(D) $\cos(x+y) + 2^y - x = 0$

19) Let f be the function given by $f(x) = \sin x + e^{-x} + 3x$. Which of the following statements is true for $y = f(x)$?

(A) $y'' = \sin x + e^{-x}$

(B) $\frac{d^3y}{dx^3} = \frac{dy}{dx}$

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

(D) $y - \frac{d^4y}{dx^4} = 3x$