3. If $y = \frac{3}{4 + x^2}$, then $\frac{dy}{dx} =$

(A) $\frac{3}{2x}$

(B) $\frac{3x}{\left(1 + x^2\right)^2}$

(C) $\frac{6x}{\left(4 + x^2\right)^2}$

(D) $\frac{-6x}{\left(4 + x^2\right)^2}$

(E) $\frac{-3}{\left(4 + x^2\right)^2}$

6. If $y = \frac{\ln x}{x}$, then $\frac{dy}{dx} =$

(A) $\frac{1}{x}$ (B) $\frac{1}{x^2}$ (C) $\frac{\ln x - 1}{x^2}$ (D) $\frac{1 - \ln x}{x^2}$ (E) $\frac{1 + \ln x}{x^2}$

1. If $y = x^2 e^x$, then $\frac{dy}{dx} =$

$2xe^x + x^2$

(A) $2xe^x$

(B) $x(x+2e^x)$

(C) $xe^x(x+2)$

(D) $2x+e^x$

(E) $2x+e$

16. If $f(x) = \ln(\cos 2x)$, then $f'(x) =$

(A) $-2\tan 2x$ (B) $\cot 2x$ (C) $\tan 2x$ (D) $-2\cot 2x$ (E) $2\tan 2x$

16. If $y = \cos^2 x - \sin^2 x$, then $y' =$

(A) -1

(B) 0

(C) $-2(\cos x + \sin x)$

(D) $2(\cos x + \sin x)$

(E) $-4(\cos x)(\sin x)$

Ans

18. If $g(x) = \text{Arcsin } 2x$, then $g'(x) =$

(A) $2\text{Arccos } 2x$

(B) $2 \csc 2x \cot 2x$

(C) $\dfrac{2}{1+4x^2}$

(D) $\dfrac{2}{\sqrt{4x^2-1}}$

(E) $\dfrac{2}{\sqrt{1-4x^2}}$

19. The derivative of $\sqrt{x} - \dfrac{1}{x\sqrt[3]{x}}$ is

(A) $\dfrac{1}{2}x^{-1/2} - x^{-4/3}$

(B) $\dfrac{1}{2}x^{-1/2} + \dfrac{4}{3}x^{-7/3}$

(C) $\dfrac{1}{2}x^{-1/2} - \dfrac{4}{3}x^{-1/3}$

(D) $-\dfrac{1}{2}x^{-1/2} + \dfrac{4}{3}x^{-7/3}$

(E) $-\dfrac{1}{2}x^{-1/2} - \dfrac{4}{3}x^{-1/3}$

15. $\frac{d}{dx}[\text{Arctan } 3x] =$

(A) $\frac{1}{1+9x^2}$

(B) $\frac{3}{1+9x^2}$

(C) $\frac{3}{\sqrt{4x^2-1}}$

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

(E) none of the above

1. If $y = \cos^2(2x)$, then $\frac{dy}{dx} =$

(A) $2\cos 2x \sin 2x$

(B) $-4\sin 2x \cos 2x$

(C) $2\cos 2x$

(D) $-2\cos 2x$

(E) $4\cos 2x$

11. If $g(x) = \dfrac{x-2}{x+2}$, then $g'(2) =$

(A) 1

(B) -1

(C) $\frac{1}{4}$

(D) $-\frac{1}{4}$

(E) 0

28. If $f(x) = \sin(2x) + \ln(x+1)$, then $f'(0) =$

(A) -1 (B) 0 (C) 1 (D) 2 (E) 3

16. If $f(x) = e^{2x}$ and $g(x) = \ln x$, then the derivative of $y = f(g(x))$ at $x = e$ is

(A) e^2

(B) $2e^2$

(C) $2e$

(D) 2

(E) undefined

If $g(x) = \sqrt[3]{x-1}$ and f is the inverse function of g, then $f'(x) =$

(A) $3x^2$

(B) $3(x-1)^2$

(C) $-\frac{1}{3}(x-1)^{-4/3}$

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

(E) does not exist

6. If $f(x) = 2x + \sin x$ and the function g is the inverse of f, then $g'(2) =$

(A) 0.324
(B) 0.342
(C) 0.360
(D) 0.378
(E) 0.396

12. Let $f(x) = \dfrac{\ln e^{2x}}{x-1}$ for $x > 1$. If g is the inverse of f, then $g'(3) =$

(A) 2 (B) 1 (C) 0 (D) –1 (E) –2

13. The fourth derivative of $f(x) = (2x - 3)^4$ is

(A) $24(2^4)$

(B) $24(2^3)$

(C) $24(2x - 3)$

(D) $24(2^5)$

(E) 0

20. If $y = e^{kx}$, then $\frac{d^5y}{dx^5} =$

(A) k^5e^x

(B) k^5e^{kx}

(C) $5!e^{kx}$

(D) $5!e^x$

(E) $5e^{kx}$

2. For $x \neq 0$, the slope of the tangent to $y = x \cos x$ equals zero whenever

(A) $\tan x = -x$

(B) $\tan x = \frac{1}{x}$

(C) $\tan x = x$

(D) $\sin x = x$

(E) $\cos x = x$

22 The slope of line tangent to the graph of $f(x) = \ln(e^{2x} + 3\sin x)$ at $x = 0$ is

(A) 1

(B) 2

(C) 3

(D) 4

(E) 5

5. An equation of the line tangent to the graph of $f(x) = x(1 - 2x)^3$ at the point $(1, -1)$ is

(A) $y = -7x + 6$ (B) $y = -6x + 5$ (C) $y = -2x + 1$

(D) $y = 2x - 3$ (E) $y = 7x - 8$

20. An equation for a tangent line to the graph of $y = \text{Arctan}\,\frac{x}{3}$ at the origin is:

(A) $x - 3y = 0$

(B) $x - y = 0$

(C) $x = 0$

(D) $y = 0$

(E) $3x - y = 0$

1. At what input x do the graphs of $y = x^2 - \frac{1}{e^x}$ and $y = 2\sqrt{x}$ have parallel tangent lines?

(A) 0. 435 (B) 0.790 (C) 0.865 (D) 1.112 (E) 1.765

Ans