

AP Calculus BC
More Practice with Differentiation

Find $\frac{dy}{dx}$ of the given functions.

1. $y = x^5 \tan x$

a) $5x^4 \tan x$ b) $x^5 \sec^2 x$ c) $5x^4 \sec^2 x$ d) $5x^4 + \sec^2 x$ e) $5x^4 \tan x + x^5 \sec^2 x$

2. $y = \frac{2-x}{3x+1}$

a) $-\frac{7}{(3x+1)^2}$ b) $\frac{6x-5}{(3x+1)^2}$ c) $-\frac{9}{(3x+1)^2}$ d) $\frac{7}{(3x+1)^2}$ e) $\frac{7-6x}{(3x+1)^2}$

3. $y = \sqrt{3-2x}$

a) $\frac{1}{2\sqrt{3-2x}}$ b) $-\frac{1}{\sqrt{3-2x}}$ c) $-\frac{(3-2x)^{3/2}}{3}$ d) $-\frac{1}{3-2x}$ e) $\frac{2}{3}(3-2x)^{3/2}$

4. $y = \frac{2}{(5x+1)^3}$

a) $-\frac{30}{(5x+1)^2}$ b) $-30(5x+1)^{-4}$ c) $\frac{-6}{(5x+1)^4}$ d) $-\frac{10}{3}(5x+1)^{-4/3}$ e) $\frac{30}{(5x+1)^4}$

5. $y = 3x^{2/3} - 4x^{1/2} - 2$

a) $2x^{1/3} - 2x^{-1/2}$ b) $3x^{-1/3} - 2x^{-1/2}$ c) $\frac{9}{5}x^{5/3} - 8x^{3/2}$ d) $\frac{2}{x^{1/3}} - \frac{2}{x^{1/2}} - 2$ e) $2x^{-1/3} - 2x^{-1/2}$

6. $y = 2\sqrt{x} - \frac{1}{2\sqrt{x}}$

a) $x + \frac{1}{x\sqrt{x}}$ b) $x^{-1/2} + x^{-3/2}$ c) $\frac{4x-1}{4x\sqrt{x}}$ d) $\frac{1}{\sqrt{x}} + \frac{1}{4x\sqrt{x}}$ e) $\frac{4}{\sqrt{x}} + \frac{1}{x\sqrt{x}}$

7. $y = \sqrt{x^2 + 2x - 1}$

a) $\frac{x+1}{y}$ b) $4y(x+1)$ c) $\frac{1}{2\sqrt{x^2 + 2x - 1}}$ d) $-\frac{x+1}{(x^2 + 2x - 1)^{3/2}}$ e) none of these

8. $y = \frac{x^2}{\cos x}$

a) $\frac{2x}{\sin x}$ b) $-\frac{2x}{\sin x}$ c) $\frac{2x \cos x - x^2 \sin x}{\cos^2 x}$ d) $\frac{2x \cos x + x^2 \sin x}{\cos^2 x}$ e) $\frac{2x \cos x + x^2 \sin x}{\sin^2 x}$

9. $y = \sin\left(\frac{1}{x}\right)$

a) $\cos\left(\frac{1}{x}\right)$ b) $\cos\left(-\frac{1}{x^2}\right)$ c) $-\frac{1}{x^2} \cos\left(\frac{1}{x}\right)$ d) $-\frac{1}{x^2} \sin\left(\frac{1}{x}\right) + \frac{1}{x} \cos\left(\frac{1}{x}\right)$ e) $\cos(\ln x)$

10. $y = \frac{1}{2 \sin 2x}$

a) $-\csc 2x \cot 2x$ b) $\frac{1}{4 \cos 2x}$ c) $-4 \csc 2x \cot 2x$ d) $\frac{\cos 2x}{2\sqrt{\sin 2x}}$ e) $-\csc^2 2x$

11. $y = \frac{1+x^2}{1-x^2}$

a) $-\frac{4x}{(1-x^2)^2}$ b) $\frac{4x}{(1-x^2)^2}$ c) $\frac{-4x^3}{(1-x^2)^2}$ d) $\frac{2x}{1-x^2}$ e) $\frac{4}{1-x^2}$

12. $x^3 - y^3 = 1$

a) x b) $3x^2$ c) $\sqrt[3]{3x^2}$ d) $\frac{x^2}{y^2}$ e) $\frac{3x^2 - 1}{y^2}$

13. $x + \cos(x + y) = 0$

a) $\csc(x + y) - 1$ b) $\csc(x + y)$ c) $\frac{x}{\sin(x + y)}$ d) $\frac{1}{\sqrt{1 - x^2}}$ e) $\frac{1 - \sin x}{\sin y}$

14. $\sin x - \cos y - 2 = 0$

a) $-\cot x$ b) $-\cot y$ c) $\frac{\cos x}{\sin y}$ d) $-\csc y \cos x$ e) $\frac{2 - \cos x}{\sin y}$

15. $3x^2 - 2xy + 5y^2 = 1$

a) $\frac{3x + y}{x - 5y}$ b) $\frac{y - 3x}{5y - x}$ c) $3x + 5y$ d) $\frac{3x + 4y}{x}$ e) none of these

16. If $f(x) = x^4 - 4x^3 + 4x^2 - 1$, then the set of values of x for which the derivative equals zero is

a) $\{1, 2\}$ b) $\{0, -1, -2\}$ c) $\{-1, 2\}$ d) $\{0\}$ e) $\{0, 1, 2\}$

17. If $f(x) = 16\sqrt{x}$, then $f''(4)$ is equal to

a) -32 b) -16 c) -4 d) -2 e) $-\frac{1}{2}$

18. If a point moves on the curve $x^2 + y^2 = 25$, then at $(0, 5)$, $\frac{d^2y}{dx^2}$ is

a) 0 b) $\frac{1}{5}$ c) -5 d) $-\frac{1}{5}$ e) nonexistent

19. If $f(x) = 5^x$ and $5^{1.002} \approx 5.016$, which is closest to $f'(1)$?

a) 0.016 b) 1.0 c) 5.0 d) 8.0 e) 32.0

1. e

2. a

3. b

4. b

5. e

6. d

7. a

8. d

9. c

10. a

11. b

12. d

13. a

14. d

15. b

16. e

17. e

18. d

19. d