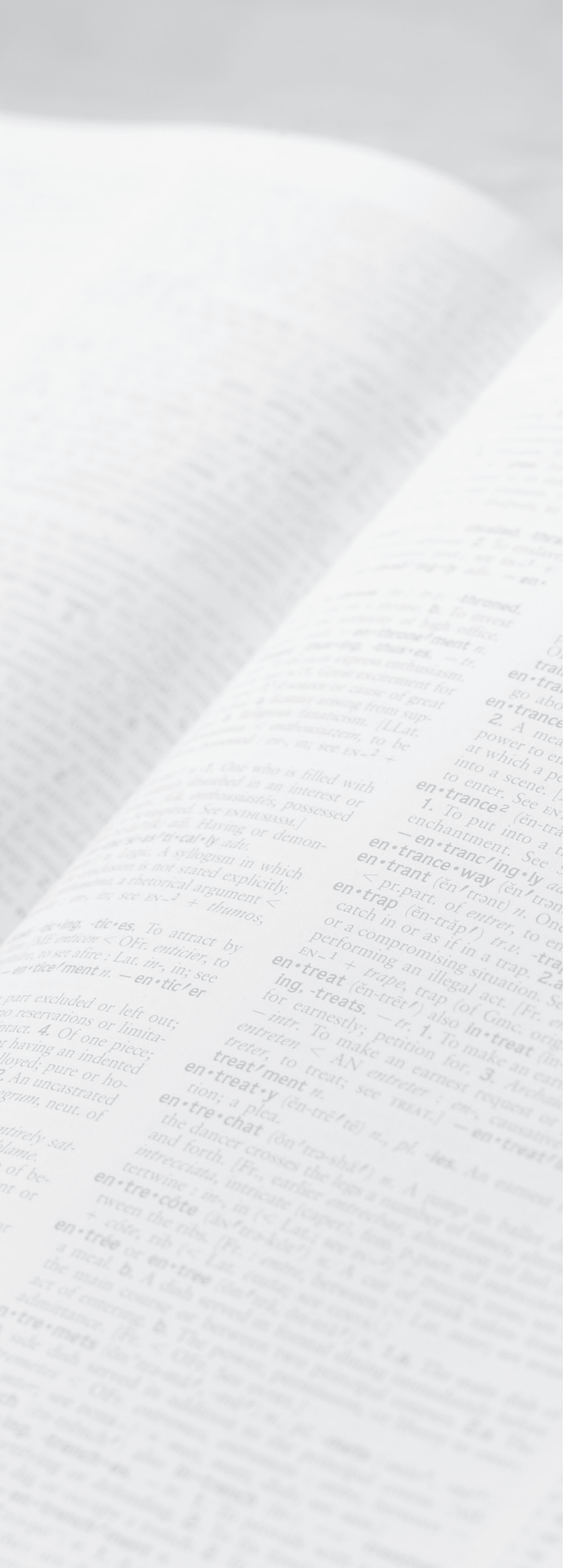

Chapter 7
Derivatives Drill 1

DERIVATIVES DRILL 1

1. If $y = (x^2 + 1)^5$, then $y' =$

   (A) $5\,(x^2 + 1)^4$
   (B) $10x\,(x^2 + 1)^4$
   (C) $5x\,(x^2 + 1)^4$
   (D) $5\,(2x)^4$
   (E) $(2x)^5$

2. If $y = 4\pi^2x^2$, then what is y'?

   (A) $8\pi^2x$
   (B) $8\pi x^2 + 8\pi^2x$
   (C) $16\pi x$
   (D) $2\pi^2x^2$
   (E) 0

3. If $f(x) = \sin x \cos x$, then $f'\left(\frac{\pi}{2}\right) =$

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

4. If $f(x) = 3x^3 - 2x^2 + x$, then $f'(2) =$

   (A) 39
   (B) 29
   (C) 19
   (D) 9
   (E) -9

5. If $y = x \cos x$, then find y'.

   (A) $\cos x + x \sin x$
   (B) $-\sin x$
   (C) $\cos x - x \sin x$
   (D) $-x \sin x$
   (E) $x \sin x - \cos x$

6. Find y' if $y = x \csc x - \cot x$.

   (A) $\csc x\,(\csc x - \cot x)$
   (B) $\csc x\,(\csc x + 1 - x \cot x)$
   (C) $\csc x\,(\csc x + \cot x)$
   (D) $-\csc x\,(x \cot x - \csc x)$
   (E) $x \csc^2 x - \cot x$

7. What is the derivative of $y = \dfrac{(3x - 4)}{(x^2 + 1)}$?

   (A) $\dfrac{(3 + 8x - 3x^2)}{(x^2 + 1)^2}$

   (B) $\dfrac{3}{2x}$

   (C) $\dfrac{(3 - 8x + 3x^2)}{(x^2 + 1)^2}$

   (D) $\dfrac{(3 + 8x + 3x^2)}{(x^2 + 1)^2}$

   (E) $\dfrac{(3 - 8x - 3x^2)}{(x^2 + 1)^2}$

8. If $f(x) = \sin x \ln x$, then what is $f'(x)$?

(A) $\dfrac{(\cos x)}{x}$

(B) $\dfrac{(\cos x \ln x)}{x}$

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

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

(E) $\cos x\left(\ln x + \dfrac{1}{x}\right)$

9. If $y = \sin(\ln x)$, then $y' =$

(A) $\cos(\ln x)$

(B) $\sin(\ln x) + \left(\dfrac{1}{x}\right)$

(C) $\dfrac{(\sin(\ln x))}{x}$

(D) $\dfrac{(\cos(\ln x))}{x}$

(E) $\dfrac{-(\cos(\ln x))}{x}$

10. If $f(x) = x^3 - \left(\dfrac{3\ln 3}{2}\right)x^2$, then what is $f'(x)$?

(A) $3x^2 - 3x \ln 3$

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

(C) $3x^2 + 3x \ln 3$

(D) $3x^2 - x \ln 3x$

(E) $\dfrac{3x^2 - 3^x}{\ln 3}$

11. If $y = \sqrt{x}\cos x$, find y'.

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

(B) $\dfrac{[-\sin x]}{2\sqrt{x}}$

(C) $\dfrac{\left(\sqrt{x}\right)}{2} - \sin x$

(D) $-x\sin x - \sqrt{x}\cos x$

(E) $x^2 \sin 2 + \left(\dfrac{1}{2\sqrt{x}}\right)$

12. If $y = x^2 \ln(2x)$, then what is the value of y' at $x = \dfrac{1}{2}$?

(A) $-\ln 4$

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

(C) 0

(D) $\dfrac{1}{2}$

(E) $\ln 4$

13. Find $f'(2)$ if $f(x) = \dfrac{(x^2+2)}{(x^4 - 3x^2 + 1)}$.

(A) -4

(B) $-\dfrac{1}{5}$

(C) 0

(D) $\dfrac{1}{5}$

(E) 4

14. If $y = \left(\frac{1 - \cos x}{1 + \cos x}\right)^4$, then find y'.

(A) $4\left[\frac{(1 - \cos x)}{(1 + \cos x)}\right]^3$

(B) $4\left[\frac{(1 + \sin x)}{(1 - \sin x)}\right]^3$

(C) $\frac{[8 \sin x\,(1 - \cos x)^3]}{(1 + \cos x)^5}$

(D) $\frac{[4 \sin x\,(1 - \cos x)^3]}{(1 + \cos x)^4}$

(E) $\frac{[-4 \sin x\,(1 - \cos x)]}{(1 + \cos x)^2}$

15. What is $f'(x)$ if $f(x) = x^3 \cos x$?

(A) $3x^2 \cos x - x^3 \sin x$
(B) $-3x^2 \sin x$
(C) $3x^2 \cos x + x^3 \sin x$
(D) $x^3 \sin x - 3x^2 \cos x$
(E) $3x^2 \sin x$

16. If $y = \frac{(\sec x)}{(1 + \tan x)}$, find $\frac{dy}{dx}$.

(A) $\frac{(\sec x \tan x)}{(\sec^2 x)^2}$

(B) $\frac{-(\sec x \tan x)}{(\sec^2 x)}$

(C) $\frac{(\tan^2 x)}{(\sec^2 x)^2}$

(D) $\frac{\sec x \tan x\,(1 + \tan x) + \sec x\,(\sec^2 x)}{(1 + \tan x)^2}$

(E) $\frac{\sec x \tan x\,(1 + \tan x) - \sec x\,(\sec^2 x)}{(1 + \tan x)^2}$

17. If $f(\theta) = \theta \sin \theta$, then what is $f''(\theta)$?

(A) $\theta \sin \theta - 2 \cos \theta$
(B) $\cos \theta - \theta \sin \theta$
(C) $-\sin \theta$
(D) $\theta \cos \theta - 2 \sin \theta$
(E) $2 \cos \theta - \theta \sin \theta$

18. If $y = x^2 \tan x$, then $y' =$

(A) $x^2 \sec^2 x$
(B) $2x \sec^2 x$
(C) $2x \tan x + x^2 \sec^2 x$
(D) $2x \tan x - x^2 \sec^2 x$
(E) $-x^2 \sec^2 x$

19. If $f(x) = 3x^2 - 3x \ln 6$, then $f'(x) =$

(A) $6x + 3 \ln 6$
(B) $66 \ln (x + 3)$
(C) $(x + 3)\,6x + 2$
(D) $63 \ln (x + 3)$
(E) $(x + 3) \ln 6$

20. If $f(x) = \left(\frac{(x + 3)}{(x^2 - 4)}\right)$, then $f'(x) =$

(A) $\frac{(x^2 - 6x - 4)}{(x^2 - 4)^2}$

(B) $\frac{(x^2 + 6x + 4)}{(x^2 - 4)^2}$

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

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

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

21. If $y = \ln(4x^2)$, then $y' =$

(A) $8x$

(B) $8x \ln(4x^2)$

(C) $\frac{4}{x^2}$

(D) $\frac{2}{x^2}$

(E) $\frac{2}{x}$

22. If $y = x^3 \sin^2 x$, then $y' =$

(A) $3x^2 \sin^2 x + 2x^3 \sin 2x$
(B) $3x^2 \sin x \cos x$
(C) $3x^2 \sin^2 x + x^3 \sin 2x$
(D) $6x^2 \sin x \cos x$
(E) $6x^2 \sin x + 2x^3 \sin x \cos x$

23. If $f(x) = (x - 2)(2x + 3)$, then $f'(x) =$

(A) 2
(B) $2x$
(C) $4x$
(D) $4x + 1$
(E) $4x - 1$

24. If $y = \frac{1}{2}x^6 - 3x^4 + x$, then $y' =$

(A) $3x^5 - 12x^3 + 1$

(B) $-3x^5 + 12x^3 - 1$

(C) $\frac{1}{14}x^7 - \frac{1}{5}x^5 + \frac{1}{2}x^2$

(D) $\frac{1}{2}x(x^5 - 6x + 2)$

(E) $15x^4 - 36x^2$

25. Find $f''(x)$ if $f(x) = \sin 3x + 2\cos x - \sin 2x$.

(A) $9 \sin 3x - 4 \sin 2x + 2 \cos x$
(B) $-9 \sin 3x + 4 \sin 2x - 2 \cos x$
(C) $4 \sin 2x - 9 \sin 3x - 2 \cos x$
(D) $4 \sin 3x - 9 \sin 2x - 2 \cos x$
(E) $-4 \sin 2x + 9 \sin 3x + 2 \cos x$

26. Find y' if $2\sqrt{x} + \sqrt{y} = 10$

(A) $2\sqrt{\frac{y}{x}}$

(B) $-2\sqrt{\frac{y}{x}}$

(C) $-2\sqrt{\frac{x}{y}}$

(D) $2\sqrt{\frac{x}{y}}$

(E) $4\sqrt{\frac{y}{x}}$

27. What is y' if $2x^3 + x^2y - xy^3 = 9$?

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

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

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

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

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

28. What is the derivative of $y^5 + x^2y^3 = 1 + x^4y$?

(A) $\dfrac{4xy - 2x^2y - 5y}{3x^2y^2 - x^4}$

(B) $\dfrac{3x^2y - 2xy^3 + 5y^4}{3x^2y^2 + x^4}$

(C) $\dfrac{4x^3y - 2xy^3 - 5y^4}{3x^2y^2 - x^4}$

(D) $\dfrac{x^3y - 3xy^3 - 5y^4}{3x^2y^2 - x^4}$

(E) $\dfrac{4x^3y + 2xy^3 + 5y^4}{3x^2y^2 - x^4}$

29. Find y' if $1 + x = \sin(xy^2)$.

(A) $\dfrac{1 - y^2\cos(xy^2)}{2xy\cos(xy^2)}$

(B) $\dfrac{2xy\cos(xy^2)}{1 - y^2\cos(xy^2)}$

(C) $\dfrac{1 + y^2\cos(xy^2)}{2xy\cos(xy^2)}$

(D) $\cos(xy^2) - 1$

(E) $2xy\cos(xy^2) - 1$

30. $\dfrac{d}{dx}\left(2\left(x^2+3\right)^3\right) =$

(A) $6\left(x^2+3\right)^2$

(B) $4x\left(x^2+3\right)^2$

(C) $12x\left(x^2+3\right)^2$

(D) $6x\left(x^2+3\right)^2$

(E) $4\left(x^2+3\right)^2$