



MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

DIFFERENTIATION

Example

1. Find the derivatives of

(i) x^9 , (ii) x^{-3} , (iii) $3\sqrt{x}$, (iv) $\frac{1}{\sqrt{x}}$



Watch Video Solution

2. Find the derivative of

(i) $8x^3$, (ii) $6\sqrt{x}$, (iii) $5e^x$, (iv) 9×2^x



[Watch Video Solution](#)

3. Find the derivative of $(x^3 + e^x + e^x + \cot x)$

with respect to x .



[Watch Video Solution](#)

4. Find the derivative of $\left(9x^2 + \frac{3}{x} + 5\sin x\right)$ with respect to x .



Watch Video Solution

Solved Examples

1. Differentiate the following functions with respect to x :

$$\left(x^2 + \frac{4}{x^2} - \frac{2}{3}\tan x + 6e\right)$$

A. $x - \frac{8}{x^3} - \frac{1}{3}\sec^2 x$

B. $2x - \frac{2}{x^3} - \frac{1}{3}\sec^2 x$

C. $2x - \frac{8}{x^3} - \frac{1}{3}\sec^2 x$

D. $2x - \frac{8}{x^3} - \frac{2}{3}\sec^2 x$

Answer: D



Watch Video Solution

2. Find the derivative of

$$\left\{ \frac{3}{(x)^{\frac{1}{3}}} - \frac{5}{\cos x} + \frac{6}{\sin x} - \frac{2 \tan x}{\sec x} + 7 \right\}.$$



Watch Video Solution

3. Differentiate the following function :

(i) $(x^2 - 5x + 6)(x - 3)$, (ii) $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2$, (iii)
 $\frac{3x^2 + 2x + 5}{\sqrt{x}}$



Watch Video Solution

4. If $y = \sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}}$, where $0 < x < \frac{\pi}{2}$, find
 $\frac{dy}{dx}$.



Watch Video Solution

5. If $y = 1 = \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$, show that $\frac{dy}{dx} = y$.



Watch Video Solution

6. If $u = 3t^4 - 5t^3 + 2t^2 - 18t + 4$, find $\frac{du}{dt}$ at $t = 1$.



Watch Video Solution

7. Differentiate x^6 from the first principle.



Watch Video Solution

8. Differentiate each of the following from first principle: e^{3x}



[Watch Video Solution](#)

9. Find the derivative of each of the following from the first principle.

(i) $x^2 + 3x + 5$, (ii) $x^3 + 4x^2 + 3x + 2$



[Watch Video Solution](#)

10. Differentiate each of the following (i) $(x + 5)^7$,

(ii) $\left(x - \frac{1}{x}\right)$



Watch Video Solution

11. Find the derivative of each of the following from the first principle.

(i) $\sin 2x$, (ii) $\cos 3x$, (iii) $\tan 5x$



Watch Video Solution

12. Differentiate each of the following from first principle: $x \sin x$



[Watch Video Solution](#)

13. Differentiate $\frac{\sin x}{x}$ from the first principle .



[Watch Video Solution](#)

14. Differentiate $\cot(2x + 1)$ from the first principle.



[Watch Video Solution](#)

15. Find the derivative of each of the following from the first principle .

(i) $\sqrt{2x + 3}$, (ii) $\sqrt{4 - x}$, (iii) $\frac{1}{\sqrt{x}}$



View Text Solution

16. Find the derivative of $x^{-3/2}$ from the first principle .



Watch Video Solution

17. Find the derivative of $\frac{1}{x^2}$ from the first principle

A. $\frac{-2}{x}$

B. $\frac{2}{x^3}$

C. $\frac{-2}{x^2}$

D. $\frac{-2}{x^3}$

Answer: D



Watch Video Solution

18. Differentiate $\sqrt{\sin 3x}$ from the first principle.



[Watch Video Solution](#)

19. Find the derivative of $e^{\sqrt{x}}$ from the first principle.



[Watch Video Solution](#)

20. Find the derivative of e^{x^2} from the first principle.



[Watch Video Solution](#)

21. Find the derivative of $e^{\sin x}$ from the first principle.



[Watch Video Solution](#)

22. Differentiate each of the following from the first principle.

(i) $\sqrt{\sin x}$, (ii) $\sqrt{\cos x}$

(iii) $\sqrt{\tan x}$, (iv) $\sqrt{\cos ecx}$



[View Text Solution](#)

23. Differentiate each of the following from the first principle .

(i) $\sin \sqrt{x}$, (ii) $\cos \sqrt{x}$

(iii) $\tan \sqrt{x}$



View Text Solution

24. Find the derivative of the following from the first principle .

(i) $\sin^2 x$, (ii) $\cos^2 x$



Watch Video Solution

25. Find the derivative of the following from the first principle.

(i) $\sin x^2$, (ii) $\cos(x^2 + 1)$

(iii) $\tan x^2$



View Text Solution

26. Differentiate xe^x from first principles.



Watch Video Solution

27. Differentiate the following functions *w. r. t. x*

from the first principle : $x^2 \cos x$



[Watch Video Solution](#)

28. Differentiate :(i) $x e^x$, (ii) $x^2 e^x \sin x$



[Watch Video Solution](#)

29. Differentiate :(i) $x e^x$, (ii) $x^2 e^x \sin x$



[Watch Video Solution](#)

30. Differentiate : $x^2 \tan x$



Watch Video Solution

31. Differentiate $(e^x \sin x + x^p \cos x)$



Watch Video Solution

32. Differentiate $e^x (x^3 + \sqrt{x})$

A. $e^x \left\{ x^2 + 3x^2 + \frac{1}{2\sqrt{x}} + \sqrt{x} \right\}$

B. $e^x \left\{ x^3 + 3 + \frac{1}{2\sqrt{x}} + \sqrt{x} \right\}$

$$\text{C. } e^x \left\{ x^3 + 3x^2 + \frac{1}{\sqrt{x}} + \sqrt{x} \right\}$$

$$\text{D. } e^x \left\{ x^3 + 3x^2 + \frac{1}{2\sqrt{x}} + \sqrt{x} \right\}$$

Answer: D



Watch Video Solution

33. Differentiate $\left(\frac{e^x \cos x}{x^3} \right)$ using the product rule .



Watch Video Solution

34. Differentiate :

(i) $\frac{e^x}{x}$, (ii) $\left(\frac{2x + 3}{x^2 - 5}\right)$, (iii) $\frac{e^x}{(1 + \sin x)}$



Watch Video Solution

35. Differentiate $\left(\frac{x^2 + 5x - 6}{4x^2 - x + 3}\right)$



Watch Video Solution

36. Differentiate $\left(\frac{x^2 \sin x}{1 - x}\right)$



Watch Video Solution

37. If $y = \left\{ \frac{1 - \tan x}{1 + \tan x} \right\}$, show that

$$\frac{dy}{dx} = \frac{-2}{(1 + \sin 2x)}.$$



Watch Video Solution

38. Differentiate :

(i) $\left(\frac{\sin x + \cos x}{\sin x - \cos x} \right)$, (ii) $\left(\frac{\sec x - 1}{\sec x + 1} \right)$



Watch Video Solution

39. Differentiate (i) $\sin x^3$, (ii) $\sin^3 x$, (iii) $e^{\sin x}$



Watch Video Solution

40. If $y = \frac{1}{\sqrt{a^2 - x^2}}$, find $\frac{dy}{dx}$.



Watch Video Solution

41. Differentiate :

(i) $(ax + b)^m$, (ii) $(3x + 5)^6$, (iii) $\sqrt{ax^2 + 2bx + c}$



Watch Video Solution

42. Differentiate $e^{\sqrt{\cot x}}$



Watch Video Solution

43. If $y = \cos^2 x^2$, find $\frac{dy}{dx}$.



Watch Video Solution

44. Differentiate $\sqrt{\frac{1 - \tan x}{1 + \tan x}}$ w.r.t. x .

A.
$$\frac{-\sec^2 x}{(1 + \tan x)^{3/2}(1 - \tan x)}$$

B.
$$\frac{-\sec^2 x}{(1 - \tan x)^{1/2}}$$

C.
$$\frac{-\sec x}{(1 + \tan x)^{3/2}(1 - \tan x)^{1/2}}$$

D.
$$\frac{-\sec^2 x}{(1 + \tan x)^{3/2}(1 - \tan x)^{1/2}}$$

Answer: D



Watch Video Solution

45. If $y = \sin(\sqrt{\sin x + \cos x})$, find $\frac{dy}{dx}$.

A. $\cos(\sqrt{\sin x + \cos x})$

B. $\frac{\cos(\sqrt{\sin x + \cos x})(\cos x - \sin x)}{2\sqrt{\sin x - \cos x}}$

C. $\frac{\cos(\sqrt{\sin x + \cos x})(\cos x - \sin x)}{2\sqrt{\sin x + \cos x}}$

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

Answer: C



Watch Video Solution

46. Differentiate the following functions with respect to x :

$$\sin 2x \cos 3x.$$

A. $(3 \sin 2x \sin 3x + 2 \cos 3x \cos 2x)$

B. $(-3 \sin 2x \sin 3x + 2 \cos 3x \cos 2x)$

C. $(-3 \sin 2x \sin 3x - 2 \cos 3x \cos 2x)$

D. $(3 \sin 2x \sin 3x - 2 \cos 3x \cos 2x)$

Answer: B



Watch Video Solution

47. Differentiate $e^{ax} \cos(bx + c)$.



Watch Video Solution

48. Differentiate (i) $\sqrt{\frac{1+x}{1-x}}$, (ii) $\frac{x}{\sqrt{1-x^2}}$



Watch Video Solution

Exersise 28 A

1. Differentiate (i) x^{-3} (ii) $\sqrt[3]{x}$



Watch Video Solution

2. Differentiate (i) $\frac{1}{x}$ (ii) $\frac{1}{\sqrt{x}}$ (iii) $\frac{1}{\sqrt[3]{x}}$



Watch Video Solution

3. Differentiate (i) $3x^{-5}$ (ii) $\frac{1}{5x}$ (iii) $\sqrt[3]{x^2}$



Watch Video Solution

4. Differentiate (i) $6ax^5 + 4x^3 - 3x^2 + 2x - 7$ (ii)

$5x^{-3/2} + \frac{4}{\sqrt{x}} + \sqrt{x} - \frac{7}{x}$ (iii)

$ax^3 + bx^2 + cx + d$, where a, b, c, d are constants



Watch Video Solution

5. (i) $4x^3 + 3 \cdot 2^x + 6 \cdot \sqrt[8]{x^{-4}} + 5 \cot x$ (ii)

$$\frac{x}{3} - \frac{3}{x} + \sqrt{x} - \frac{1}{\sqrt{x}} + x^2 - 2^x + 6x^{-2/3} - \frac{2}{3}x^6$$



Watch Video Solution

6. (i)

$$4 \cot x - \frac{1}{2} \cos x + \frac{2}{\cos x} - \frac{3}{\sin x} + \frac{6 \cot x}{\cos e c x} + 9$$

(ii)

$$-5 \tan x + 4 \tan x \cos x - 3 \cot x \sec x + 2 \sec x - 13$$



Watch Video Solution

7. (i) $(2x + 3)(3x - 5)$ (ii) $x(1 + x)^3$ (iii)

$$\left(\sqrt{x} + \frac{1}{x}\right)\left(x - \frac{1}{\sqrt{x}}\right)$$

(iv) $\left(x - \frac{1}{x}\right)^2$ (v) $\left(x^2 + \frac{1}{x^2}\right)^3$ (vi)

$$(2x^2 + 5x - 1)(x - 3)$$



Watch Video Solution

8. Differentiate w.r.t x

(i) $\frac{3x^2 + 4x - 5}{x}$

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

$$(iii) \frac{x - 4}{2\sqrt{x}}$$

$$(iv) \frac{(1 + x)\sqrt{x}}{\sqrt[3]{x}}$$

$$(v) \frac{ax^2 + bx + c}{\sqrt{x}}$$

$$(vi) \frac{a + b \cos x}{\sin x}$$



Watch Video Solution

9. (i) If

$$y = 6x^5 - 4x^4 - 2x^2 + 5x - 9 \quad \text{find} \quad \frac{dy}{dx} \text{ at } x = -1$$

$$(ii) \text{ If } y = (\sin x + \tan x), \quad \text{find} \quad \frac{dy}{dx} \text{ at } x = \frac{\pi}{4}$$

$$(iii) \text{ If } y = \frac{(2 - 3 \cos x)}{\sin x}, \quad \text{find} \quad \frac{dy}{dx} \text{ at } x = \frac{\pi}{4}$$



Watch Video Solution

10. If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$ then prove that

$$2x \frac{dy}{dx} + y = 2\sqrt{x}$$



Watch Video Solution

11. If $y = \sqrt{\frac{x}{a}} + \sqrt{\frac{a}{x}}$, prove that

$$2xy \frac{dy}{dx} = \left(\frac{x}{a} - \frac{a}{x} \right)$$



Watch Video Solution

12. If $y = \sqrt{\frac{1 + \cos 2x}{1 - \cos 2x}}$ find $\frac{dy}{dx}$



Watch Video Solution

13. $y = \frac{1 - \tan^2(x/2)}{1 + \tan^2(x/2)}$, find $\frac{dy}{dx}$



[Watch Video Solution](#)

Exerscise 28 B

1. Differentiate w.r.t.x: $(ax + b)$



[Watch Video Solution](#)

2. Find $\frac{dy}{dx}$ for $\left(ax^2 + \frac{b}{x}\right)$



[Watch Video Solution](#)

3. differentiate $3x^2 + 2x - 5$ w.r.t. x



[Watch Video Solution](#)

4. $x^3 - 2x^2 + x + 3$



[Watch Video Solution](#)

5. x^8



Watch Video Solution

6. $\frac{1}{x^3}$



Watch Video Solution

7. $\frac{1}{x^5}$



Watch Video Solution

8. $\sqrt{ax + b}$



Watch Video Solution

9. $\sqrt{5x - 4}$



Watch Video Solution

10. $\frac{1}{\sqrt{x + 2}}$



Watch Video Solution

11. $\frac{1}{\sqrt{2x + 3}}$



Watch Video Solution

12. $\frac{1}{\sqrt{6x - 5}}$



Watch Video Solution

13. $\frac{1}{\sqrt{2 - 3x}}$



Watch Video Solution

14. $\frac{2x + 3}{3x + 2}$



Watch Video Solution

15. Differentiate the following functions with respect to x :

$$\frac{5 - x}{5 + x}$$

A. $\frac{5}{(5 + x)^2}$

B. $\frac{-1}{(5 + x)^2}$

C. $\frac{10}{(5 + x)^2}$

D. $\frac{-10}{(5 + x)^2}$

Answer: D



Watch Video Solution

16. $\frac{x^2 + 1}{x}, x \neq 0$



Watch Video Solution

17. $\sqrt{\cos 3x}$



Watch Video Solution

18. $\sqrt{\sec x}$



Watch Video Solution

19. $\tan^2 x$



Watch Video Solution

20. $\sin(2x + 3)$



Watch Video Solution

21. $\tan(3x + 1)$



Watch Video Solution

Exercise 28 C

1. $x^2 \sin x$



Watch Video Solution

2. $e^x \cos x$



Watch Video Solution

3. Differentiate the following functions with respect to x :

$$e^x \cot x$$

A. $e^x (\cot x - \cos e c^2 x)$

B. $e^x (\tan x - \cos e c^2 x)$

C. $e^x (\cot x - \sec^2 x)$

D. $e^x (\tan x - \sec^2 x)$

Answer: A



Watch Video Solution

4. $x^n \cot x$



Watch Video Solution

5. $x^3 \sec x$



Watch Video Solution

6. $(x^2 + 3x + 1)\sin x$



Watch Video Solution

7. $x^4 \tan x$



Watch Video Solution

8. $(3x - 5)(4x^2 - 3 + e^x)$



Watch Video Solution

9. find $\frac{dy}{dx}$ if $y = (x^2 - 4x + 5)(x^3 - 2)$



Watch Video Solution

10. $(x^2 + 2x - 3)(x^2 + 7x + 5)$



[Watch Video Solution](#)

11. $(\tan x + \sec x)(\cot x + \operatorname{cosec} x)$



[Watch Video Solution](#)

12. $(x^3 \cos x - 2^x \tan x)$



[Watch Video Solution](#)

Exercise 28 D

1. $\frac{2^x}{x}$



Watch Video Solution

2. $\frac{\log x}{x}$



Watch Video Solution

3. $\frac{e^x}{(1+x)}$



Watch Video Solution

4. $\frac{e^x}{(1 + x^2)}$



[Watch Video Solution](#)

5. $\left(\frac{2x^2 - 4}{3x^2 + 7}\right)$



[Watch Video Solution](#)

6. $\left(\frac{x^2 + 3x - 1}{x + 2}\right)$



[Watch Video Solution](#)

7.
$$\frac{(x^2 - 1)}{(x^2 + 7x + 1)}$$



Watch Video Solution

8.
$$\frac{(5x^2 + 6x + 7)}{(2x^2 + 3x + 4)}$$



Watch Video Solution

9. Differentiate the following w.r.t.x.
$$\frac{x}{(a^2 + x^2)}$$



Watch Video Solution

10. $\frac{x^4}{\sin x}$



[Watch Video Solution](#)

11. find derivative $\frac{\sqrt{a} + \sqrt{x}}{\sqrt{a} - \sqrt{x}}$



[Watch Video Solution](#)

12. Evaluate the following integrals:

(i) $\int \left(\frac{1 - \cos x}{1 + \cos x} \right) dx$ (ii) $\int \left(\frac{1 + \cos x}{1 - \cos x} \right) dx$



[Watch Video Solution](#)

13. $\frac{2 \cot x}{\sqrt{x}}$



Watch Video Solution

14. Differentiate $\frac{\sin x}{(1 + \cot x)}$



Watch Video Solution

15. $\int \frac{(1 + \sin x)}{(1 - \sin x)} dx = ?$



Watch Video Solution

16. Evaluate the following integrals:

(i) $\int \left(\frac{1 - \cos x}{1 + \cos x} \right) dx$ (ii) $\int \left(\frac{1 + \cos x}{1 - \cos x} \right) dx$



Watch Video Solution

17. $\left(\frac{\sin x - \cos x}{\sin x + \cos x} \right)$



Watch Video Solution

18. Integrate $\frac{\sec x - \tan x}{\sec x + \tan x}$



Watch Video Solution

19. $\left(\frac{e^x + \sin x}{1 + \log x} \right)$



Watch Video Solution

20. $\frac{e^x \sin x}{\sec x}$



Watch Video Solution

21. $\frac{2^x \cot x}{\sqrt{x}}$



Watch Video Solution

22. $\frac{e^x(x-1)}{x+1}$



Watch Video Solution

23. $\frac{x \tan x}{\sec x + \tan x}$



Watch Video Solution

24. Find the derivative of $\frac{ax^2 + bx + c}{px^2 + qx + r}$



Watch Video Solution

25. $\left(\frac{\sin x - x \cos x}{x \sin x + \cos x} \right)$



Watch Video Solution

26. (i) $\cot x$ (ii) $\sec x$



Watch Video Solution

Exercise 28 E

1. $\sin 4x$



Watch Video Solution

2. $\cos 5x$



Watch Video Solution

3. $\tan 3x$



Watch Video Solution

4. $\cos x^3$



Watch Video Solution

5. $\cot^2 x$



Watch Video Solution

6. $\tan^3 x$



Watch Video Solution

7. $\tan \sqrt{x}$



Watch Video Solution

8. e^{x^4}



Watch Video Solution

9. $e^{\cot x}$



Watch Video Solution

10. $\sqrt{\sin x}$



Watch Video Solution

11. $(5 + 7x)^6$



[Watch Video Solution](#)

12. $(3 - 4x)^5$



[Watch Video Solution](#)

13. $(3x^2 - x + 1)^4$



[Watch Video Solution](#)

14. $(ax^2 + bx + c)^n$



Watch Video Solution

15. $\frac{1}{(x^2 - x + 3)^3}$



Watch Video Solution

16. Differentiate $\sin^2(2x + 3)$



Watch Video Solution

17. Differentiate $\cos^2 x^3$



Watch Video Solution

18. $\sqrt{\sin x^3}$



Watch Video Solution

19. $\sqrt{x \sin x}$



Watch Video Solution

20. Differentiate $\sqrt{\cot \sqrt{x}}$



[Watch Video Solution](#)

21. Differentiate $\cos 3x \sin 5x$



[Watch Video Solution](#)

22. Differentiate $\sin x \sin 2x$



[Watch Video Solution](#)

23. $\cos\left(\sin\sqrt{ax+b}\right)$



Watch Video Solution

24. $e^{2x} \sin 3x$



Watch Video Solution

25. $e^{3x} \cos 2x$



Watch Video Solution

26. $e^{-5x} \cot 4x$



Watch Video Solution

27. $\cos(x^3 \cdot e^x)$



Watch Video Solution

28. $e^{(x \sin x + \cos x)}$



Watch Video Solution

29. $\frac{e^x + e^{-x}}{e^x - e^{-x}}$



Watch Video Solution

30. Differentiate $\frac{e^{2x} + e^{-2x}}{e^{2x} - e^{-2x}}$ with respect to x :



Watch Video Solution

31. $\sqrt{\frac{1 - x^2}{1 + x^2}}$



Watch Video Solution

$$32. \sqrt{\frac{a^2 - x^2}{a^2 + x^2}}$$



Watch Video Solution

$$33. \sqrt{\frac{1 + \sin x}{1 - \sin x}}$$



Watch Video Solution

34.

If

$$y = \sqrt{\frac{1 + e^x}{1 - e^x}}, \text{ show that } \frac{dy}{dx} = \frac{e^x}{(1 - e^x)\sqrt{1 - e^{2x}}}$$



Watch Video Solution

35. $\frac{e^{2x} + x^3}{\cos ec2x}$



Watch Video Solution

36. If $y = \sin(\sqrt{\sin x + \cos x})$, find $\frac{dy}{dx}$.



Watch Video Solution

37. If $y = e^x \log(\sin 2x)$, find $\frac{dy}{dx}$.



Watch Video Solution

38. Find $\frac{dy}{dx}$, when

$$y = \cos\left(\frac{1 - x^2}{1 + x^2}\right)$$



Watch Video Solution

39. Find $\frac{dy}{dx}$, when :

$$y = \sin\left(\frac{1 + x^2}{1 - x^2}\right)$$



Watch Video Solution

40. Find $\frac{dy}{dx}$, when :

$$y = \frac{(\sin x + x^2)}{\cot 2x}$$



Watch Video Solution

41. Find $\frac{dy}{dx}$, when :

If $y = \frac{(\cos x - \sin x)}{(\cos x + \sin x)}$, prove that

$$\frac{dy}{dx} + y^2 + 1 = 0.$$



Watch Video Solution

42. Find $\frac{dy}{dx}$, when

If $y = \frac{\cos x + \sin x}{\cos x - \sin x}$, show that

$$\frac{dy}{dx} = \sec^2\left(x + \frac{\pi}{4}\right).$$



Watch Video Solution

43. If $y = \sqrt{\frac{1-x}{1+x}}$, find $\frac{dy}{dx}$ and prove that $(1-x^2)\frac{dy}{dx} + y = 0$



Watch Video Solution

44. Find $\frac{dy}{dx}$, when If $y = \sqrt{\frac{\sec x - \tan x}{\sec x + \tan x}}$, show that $\frac{dy}{dx} = \sec x(\tan x - \sec x)$.



Watch Video Solution