MR GAUTAM SIR

Exercise-5.1, Exercise-5.2 class-11

Formula

1. $\frac{d(x^n)}{dx} = nx^{n-1}$

2. $\frac{d(a^x)}{dx} = a^x \cdot \log a$

3. $\frac{d(e^x)}{dx} = e^x$

4. $\frac{d(\log x)}{dx} = \frac{1}{x}$

5. $\frac{d(\sqrt{x})}{dx} = \frac{1}{2\sqrt{x}}$

6. $\frac{dx}{dx} = 1$

7. $\frac{d(c)}{dx} = 0$

8. $\frac{d(\sin x)}{dx} = \cos x$

9. $\frac{d(\cos x)}{dx} = -\sin x$

10. $\frac{d(\tan x)}{dx} = \sec^2 x$

11. $\frac{d(\sec x)}{dx} = \sec x \cdot \tan x$

12. $\frac{d(\operatorname{cosec} x)}{dx} = -\operatorname{cosec} x \cdot \cot x$

13. $\frac{d(\cot x)}{dx} = -\operatorname{cosec}^2 x$

14. $\frac{d(\sin^{-1} x)}{dx} = \frac{1}{\sqrt{1-x^2}}$

15. $\frac{d(\cos^{-1} x)}{dx} = \frac{-1}{\sqrt{1-x^2}}$

16. $\frac{d(\tan^{-1} x)}{dx} = \frac{1}{1+x^2}$

17. $\frac{d(\cot^{-1} x)}{dx} = \frac{-1}{1+x^2}$

18. $\frac{d(\sec^{-1} x)}{dx} = \frac{1}{x\sqrt{x^2-1}}$

19. $\frac{d(\operatorname{cosec}^{-1} x)}{dx} = \frac{-1}{x\sqrt{x^2-1}}$

20. $\frac{d(u \pm v)}{dx} = \frac{du}{dx} \pm \frac{dv}{dx}$

21. $\frac{d(u \cdot v)}{dx} = v \cdot \frac{du}{dx} + u \cdot \frac{dv}{dx}$

22. $\frac{d(\frac{u}{v})}{dx} = \frac{v \cdot \frac{du}{dx} - u \cdot \frac{dv}{dx}}{v^2}$

23. $\frac{d(\frac{1}{x})}{dx} = \frac{-1}{x^2}$

24. $\frac{d(\frac{1}{\sqrt{x}})}{dx} = \frac{-1}{2x\sqrt{x}}$

25. $\log a + \log b = \log ab$

26. $\log a - \log b = \log \frac{a}{b}$

खुद का शिक्षक बनकर स्वयं को शिक्षा देना ही सर्वोत्तम है

7. $\log a^n = n \log a$

8. $\log a^b = \frac{\log_e b}{\log_e a}$

9. $\log e = \log 10 = 1$

10. $\log 1 = 0$

11. $\sqrt{x} = x^{1/2}$

12. $x^{1/2} = \sqrt{x}$

13. $\log(ab) = b \log a$

34. $\frac{\sin x}{x} = 1$

35. $\cos \pi = -1$

36. $\sin 0^\circ = 0$

37. $\cos 0^\circ = 1$

अवकलनीयता (Differentiability) की जाँच :-

$x = a$ पर

$Lf'(a) = Rf'(a)$

$Lf'(a)$ = left derivative

$Rf'(a)$ = Right derivative

$Lf'(a) = \lim_{h \to 0} \frac{F(a-h) - f(a)}{-h}$

$Rf'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$

Exercise 5.2

Class-12th Jai maa saraswati Formula of Math

Exercise-7.4

① $\int \frac{dx}{x^2-a^2} = \frac{1}{2a} \log \left| \frac{x-a}{x+a} \right| + c$

② $\int \frac{dx}{a^2-x^2} = \frac{1}{2a} \log \left| \frac{a+x}{a-x} \right| + c$

③ $\int \frac{dx}{x^2+a^2} = \frac{1}{a} \tan^{-1} \frac{x}{a} + c$

④ $\int \frac{dx}{\sqrt{x^2-a^2}} = \log |x+\sqrt{x^2-a^2}| + c$

⑤ $\int \frac{dx}{\sqrt{a^2-x^2}} = \sin^{-1}\left(\frac{x}{a}\right) + c$

⑥ $\int \frac{dx}{\sqrt{x^2+a^2}} = \log |x+\sqrt{x^2+a^2}| + c$

⑦ $\int \frac{dx}{ax^2+bx+c}$ = By completing square method

⑧ $\int \frac{px+q}{\sqrt{ax^2+bx+c}}$

completing the square methods quadratic equations.

ax^2+bx+c , $a=1$

$\Rightarrow a\left\{x^2+\frac{b}{a}x+\frac{c}{a}\right\}=0$ $\quad \left(\frac{1}{2}\cdot\frac{b}{a}\right)^2 = \frac{b^2}{4a^2}$

$\Rightarrow a\left\{x^2+\frac{b}{a}x+\frac{c}{a}+\frac{b^2}{4a^2}-\frac{b^2}{4a^2}\right\}=0$ $\quad \left\{\left(\frac{b}{2a}\right)^2 = \frac{b^2}{4a^2}\right.$

$\Rightarrow a\left[\left(x+\frac{b}{2a}\right)^2+\frac{c}{a}-\frac{b^2}{4a^2}\right]=0$ $\quad \left.+\frac{b^2}{4a^2}, -\frac{b^2}{4a^2}\right.$

⑧ $\int \frac{px+q}{ax^2+bx+c}dx$

जहाँ p, q, a, b, c अचर हैं।

$\Rightarrow px+q = A\frac{d}{dx}(ax^2+bx+c)+B$

find value A & B

$\Rightarrow A(2ax+b)+B$

(Page-326, ⑨)

$x^2+2x+2=0 \Rightarrow \frac{2^2}{2}=1^2$

$\Rightarrow x^2+2x+1^2+1=0$

$\Rightarrow (x+1)^2+2-1$

$\Rightarrow (x+1)^2+(1)^2$

Note $x^2-3x-8+\frac{9}{4}-\frac{9}{4}$

का दूसरा का गुणांक -3 है

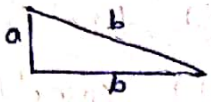
$\therefore (x-\frac{3}{2})^2 \ldots$

Inverse Trigonometry

class-12th
Sub - Math

1. $\tan^{-1}x + \cot^{-1}x = \frac{\pi}{2}$

2. $2\tan^{-1}x = \sin^{-1}\frac{2x}{1+x^2} = \cos^{-1}\frac{1-x^2}{1+x^2}$



3. $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$

4. $\sin^{-1}\frac{a}{b} = \tan^{-1}\frac{a}{\sqrt{b^2-a^2}}$ तथा $\cot^{-1}\frac{a}{b} = \tan^{-1}\frac{b}{a}$]

5. $2\tan^{-1}x = \tan^{-1}\frac{2x}{1-x^2}$

$1+\cos 2x = 2\cos^2 x$
$1-\cos 2x = 2\sin^2 x$

6. $\cos^{-1}\frac{a}{b} = \tan^{-1}\frac{\sqrt{b^2-a^2}}{a}$

7. $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$; $\tan^{-1}x - \tan^{-1}y = \tan^{-1}\left(\frac{x-y}{1+xy}\right)$

8. $\tan^{-1}\frac{a}{b} = \cos^{-1}\frac{b}{\sqrt{a^2+b^2}}$

9. $\cos^{-1}\frac{a}{b} = \tan^{-1}\frac{\sqrt{b^2-a^2}}{a}$ तथा $\sin^{-1}\frac{a}{b} = \tan^{-1}\frac{a}{\sqrt{b^2-a^2}}$

10. $\tan^{-1}\frac{a}{b} = \sin^{-1}\frac{a}{\sqrt{a^2+b^2}}$

11. $2\tan^{-1}x = \cos^{-1}\left[\frac{1-x^2}{1+x^2}\right]$

21. $\sin 2\theta = \frac{2\tan\theta}{1+\tan^2\theta}$

12. $1+\cos y = 2\cos^2\frac{y}{2}$

22. $\cos 2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$

13. $1-\cos y = 2\sin^2\frac{y}{2}$

14. $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$

15. $\cos^{-1}\frac{a}{b} = \sin^{-1}\frac{\sqrt{b^2-a^2}}{b}$

16. $\tan^{-1}x - \tan^{-1}y = \tan^{-1}\left(\frac{x-y}{1+xy}\right)$

17. $\cos 2y = 1-2\sin^2 y$ $(\cos 2x = 1-2\sin^2 x)$

18. $\sin^{-1}\frac{1}{x} = \operatorname{cosec}^{-1}x$, $x \geq 1$ या $x \leq -1$

19. $\cos^{-1}\frac{1}{x} = \sec^{-1}x$, $x \geq 1$ या $x \leq -1$

20. $\tan^{-1}\frac{1}{x} = \cot^{-1}x$, $x > 0$

$\tan\frac{2}{3} = \cos^{-1}\frac{3}{\sqrt{2^2+3^2}} = \frac{3}{\sqrt{4+9}} = \frac{3}{\sqrt{13}}$

$\cos^{-1}\frac{3}{\sqrt{13}}$

$\tan^{-1}x + \tan^{-1}y$
$\Rightarrow \tan^{-1}\left(\frac{x+y}{1-xy}\right)$

$\tan^{-1}x - \tan^{-1}y$
$\Rightarrow \tan^{-1}\left[\frac{x-y}{1+xy}\right]$

Gautam kumar

Invase Trigonometry

2. (i) $\sin^{-1}(-x) = -\sin^{-1}x$, $x \in [-1, 1]$

(ii) $\tan^{-1}(-x) = -\tan^{-1}x$, $x \in R$

(iii) $\operatorname{cosec}^{-1}(-x) = -\operatorname{cosec}^{-1}x$

3. (i) $\cos^{-1}(-x) = \pi - \cos^{-1}x$, $x \in [-1, 1]$

(ii) $\sec^{-1}(-x) = \pi - \sec^{-1}x$, $|x| \geq 1$

(iii) $\cot^{-1}(-x) = \pi - \cot^{-1}x$, $x \in R$

4. (i) $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$, $x \in (-1, 1]$

(ii) $\tan^{-1}x + \cot^{-1}x = \frac{\pi}{2}$, $x \in R$

(iii) $\operatorname{cosec}^{-1}x + \sec^{-1}x = \frac{\pi}{2}$, $|x| \geq 1$

Soln (i) $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$

let $\sin x = y$

y

let $\sin^{-1}x = y$

$x = \sin y$

$x = \sin \cos\left(\frac{\pi}{2} - y\right)$

$\Rightarrow \cos^{-1}x = \frac{\pi}{2} - y$

$\Rightarrow \cos^{-1}x = \frac{\pi}{2} - \sin^{-1}x \Rightarrow \sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$ Proved

(ii) $\tan^{-1}x + \cot^{-1}x = \frac{\pi}{2}$

let $\tan^{-1}x = y$

$\tan y = x$

$x = \tan y$; $x = \cot\left(\frac{\pi}{2} - y\right)$; $\cot^{-1}x = \frac{\pi}{2} - \tan^{-1}x$

$\Rightarrow \tan^{-1}x + \cot^{-1}x = \frac{\pi}{2}$ Proved

(iii) $\operatorname{cosec}^{-1}x + \sec^{-1}x = \frac{\pi}{2}$

let $\operatorname{cosec}^{-1}x = y$

$x = \operatorname{cosec} y$

$x = \sec\left(\frac{\pi}{2} - y\right)$

$\sec^{-1}x = \frac{\pi}{2} - y$

$\sec^{-1}x = \frac{\pi}{2} - \operatorname{cosec}^{-1}x$ (put $y = \operatorname{cosec}^{-1}x$)

$\operatorname{cosec}^{-1}x + \sec^{-1}x = \frac{\pi}{2}$

5. (i) $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\frac{x+y}{1-xy}$

(ii) $\tan^{-1}x - \tan^{-1}y = \tan^{-1}\frac{x-y}{1+xy}$

(iii) $2\tan^{-1}x = \tan^{-1}\frac{2x}{1-x^2}$, $|x| < 1$

6. (i) $2\tan^{-1}x = \sin^{-1}\frac{2x}{1+x^2}$, $|x| \leq 1$

(ii) $2\tan^{-1}x = \cos^{-1}\frac{1-x^2}{1+x^2}$, $x \geq 0$

Let $\tan^{-1}x = y$, $x = \tan y$

$\sin^{-1}\frac{2x}{1+x^2} = \sin^{-1}\frac{2\tan y}{1+\tan^2 y}$

$= \sin^{-1}(\sin 2y)$

$\Rightarrow 2\tan^{-1}x$ Prove

NCERT Trigo 12th Maths Formula 01.

Jai maa Saraswati

1. $\sin(x \pm y) = \sin x \cdot \cos y \pm \cos x \cdot \sin y$

2. $\cos(x \pm y) = \cos x \cdot \cos y \mp \sin x \cdot \sin y$

3. $\tan(x+y) = \dfrac{\tan x + \tan y}{1 - \tan x \cdot \tan y}$

4. $\tan(x-y) = \dfrac{\tan x - \tan y}{1 + \tan x \cdot \tan y}$

5. $\cot(x+y) = \dfrac{\cot y \cdot \cot x - 1}{\cot y + \cot x}$

6. $\cot(x-y) = \dfrac{\cot y \cdot \cot x + 1}{\cot y - \cot x}$

7. $\sin 2x = 2\sin x \cdot \cos x = \dfrac{2\tan x}{1 + \tan^2 x}$

8. $\cos 2x = \cos^2 x - \sin^2 x = 2\cos^2 x - 1$

9. $= 1 - 2\sin^2 x = \dfrac{1 - \tan^2 x}{1 + \tan^2 x}$

10. $\tan 2x = \dfrac{2\tan x}{1 - \tan^2 x}$

11. $\sin 3x = 3\sin x - 4\sin^3 x$

12. $\cos 3x = 4\cos^3 x - 3\cos x$

13. $\tan 3x = \dfrac{3\tan x - \tan^3 x}{1 - 3\tan^2 x}$

14. $\sin^3 x = \dfrac{3\sin x - \sin 3x}{4}$

15. $\cos^3 x = \dfrac{3\cos x + \cos 3x}{4}$

Name - Gautam Kumar

15. $1+\cos 2x = 2\cos^2 x$

16. $1-\cos 2x = 2\sin^2 x$

17. $\frac{\cos x - \sin x}{\cos x + \sin x} = \frac{1-\tan x}{1+\tan x} = \tan\left(\frac{\pi}{4} - x\right)$

18. $\frac{\cos x + \sin x}{\cos x - \sin x} = \frac{1+\tan x}{1-\tan x} = \tan\left(\frac{\pi}{4} - x\right)$

19. $1+\sin 2x = (\cos x + \sin x)^2$

20. $1-\sin 2x = (\cos x - \sin x)^2$

$\frac{d(x^n)}{dx} = nx^{n-1}$

21. $\cos x \cdot \cos y = \frac{\cos(x-y)+\cos(x+y)}{2}$

22. $\sin x \cdot \sin y = \frac{\cos(x-y)-\cos(x+y)}{2}$

23. $\sin x \cdot \cos y = \frac{\sin(x+y)+\sin(x-y)}{2}$

24. $\cos x \cdot \sin y = \frac{\sin(x+y)-\sin(x-y)}{2}$

25. $\sin^2 x + \cos^2 x = 1$

26. $\sec^2 x - \tan^2 x = 1$

27. $\operatorname{cosec}^2 x - \cot^2 x = 1$

28. $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}$

29. $\sec^{-1} x + \operatorname{cosec}^{-1} x = \frac{\pi}{2}$

30. $\tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}$

31. $\sin(90^\circ - A) = \cos A$

32. $\cos(90^\circ - A) = \sin A$

33. $\tan(90^\circ - A) = \cot A$

34. $\cot(90^\circ - A) = \tan A$

35. $\operatorname{cosec}(90 - A) = \sec A$

36. $\sec(90^\circ - A) = \operatorname{cosec} A$

37. $\tan\theta = \frac{\sin\theta}{\cos\theta}$

38. $\cot\theta = \frac{\cos\theta}{\sin\theta}$

39. $\sec\theta = \frac{1}{\cos\theta}$

40. $\operatorname{cosec}\theta = \frac{1}{\sin\theta}$

Exercise – 7.1, 7.2, 7.3

Teacher

$\frac{d}{dx}(-\cot^{-1}x) = \frac{1}{1+x^2}$ $\quad \int \frac{dx}{1+x^2} = -\cot^{-1}x + C$

$\frac{d}{dx}(\sec^{-1}x) = \frac{1}{x\sqrt{x^2-1}}$ $\quad \int \frac{dx}{x\sqrt{x^2-1}} = \sec^{-1}x + C$

$\frac{d}{dx}(-\operatorname{cosec}^{-1}x) = \frac{1}{x\sqrt{x^2-1}}$ $\quad \int \frac{dx}{x\sqrt{x^2-1}} = -\operatorname{cosec}^{-1}x + C$

$\frac{d}{dx}(e^x) = e^x$ $\quad \int e^x dx = e^x + C$

$\frac{d}{dx}(\log|x|) = \frac{1}{x}$ $\quad \int \frac{1}{x} dx = \log|x| + C$

$\frac{d}{dx}\left(\frac{a^x}{\log a}\right) = a^x$ $\quad \int a^x dx = \frac{a^x}{\log a} + C$

Formula

ii) $\int \frac{1}{\sqrt{x}} \cdot dx = 2\sqrt{x} + C$

iii) $\int \sqrt{x} \cdot dx = \frac{2}{3}x^{3/2} + C$

iv) $\int 1 \, dx = x$

Ex-7.2 Example

(i) ~~Proof~~

$\sin(a-b) = \sin a \cdot \cos b - \sin b \cos a$

$\int \cot x \cdot dx = \log|\sin x|$

(xvii) $\int \frac{dx}{1+x^2} = -\cot^{-1}x + C$

(xviii) $\int \tan x \, dx = \log|\sec x| + C$

(xix) $\int \cot x \, dx = \log|\sin x| + C$

(xx) $\int \sec x \, dx = \log|\sec x + \tan x| + C$

(xxi) $\int \operatorname{cosec} x \, dx = \log|\operatorname{cosec} x - \cot x| + C$

Exercise – 7.3

(त्रिकोणमिति अर आधारित समाकलन)

1. $\sin^2 x = \frac{1-\cos 2x}{2}$ (ii) $2\sin^2 A = 1 - \cos 2A$

2. $\cos^2 x = \frac{1+\cos 2x}{2}$

3. $\sin x \cdot \sin y = \frac{\cos(x-y) - \cos(x+y)}{2}$ $\quad 2\sin A \cdot \sin B = \cos(A-B) - \cos(A+B)$

:- 12th MATHS FORMULA :-

NCERT

Exercise - 7.1

अवकलज (Derivatives)	समाकलन (प्रतिअवकलज) Integrals (Antiderivatives)
(i) $\frac{d}{dx}\left(\frac{x^{n+1}}{n+1}\right) = x^n$	$\int x^n dx = \frac{x^{n+1}}{n+1} + C$, $n \neq -1$
$\frac{d}{dx}(x) = 1$	$\int dx = x + C$
(ii) $\frac{d}{dx}(\sin x) = \cos x$	$\int \cos x dx = \sin x + C$
(iii) $\frac{d}{dx}(-\cos x) = \sin x$	$\int \sin x dx = -\cos x + C$
(iv) $\frac{d}{dx}(\tan x) = \sec^2 x$	$\int \sec^2 x \cdot dx = \tan x + C$
(v) $\frac{d}{dx}(-\cot x) = \operatorname{cosec}^2 x$	$\int \operatorname{cosec}^2 x dx = -\cot x + C$
(vi) $\frac{d}{dx}(\sec x) = \sec x \cdot \tan x$	$\int \sec x \cdot \tan x = \sec x + C$
(vii) $\frac{d}{dx}(-\operatorname{cosec} x) = \operatorname{cosec} x \cdot \cot x$	$\int \operatorname{cosec} x \cdot \cot x dx = -\operatorname{cosec} x + C$
(viii) $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$	$\int \frac{dx}{\sqrt{1-x^2}} = \sin^{-1} x + C$
(ix) $\frac{d}{dx}(-\cos^{-1} x) = \frac{1}{\sqrt{1-x^2}}$	$\int \frac{dx}{\sqrt{1-x^2}} = -\cos^{-1} x + C$
(x) $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$	$\int \frac{dx}{1+x^2} = \tan^{-1} x + C$