Antiderivatives

DEF: A Function F is an Antiderivative of f on an interval I when $F'(x) = f(x)$ for x in I.

Integration Formulas

$$\int 0\,dx = C$$

$$\int k\,dx = kx + C$$

$$\int k f(x)\,dx = k\int f(x)\,dx$$

$$\int [f(x) \pm g(x)]\,dx = \int f(x)\,dx \pm \int g(x)\,dx$$

$$\int x^n\,dx = \frac{1}{n+1}x^{n+1} + C, \quad n \neq -1$$

More formulas

$$\int \cos x \, dx = \sin x + C$$

$$\int \sin x \, dx = -\cos x + C$$

$$\int \sec^2 x \, dx = \tan x + C$$

$$\int \sec x \tan x \, dx = \sec x + C$$

$$\int \csc^2 x \, dx = -\cot x + C$$

$$\int \csc x \cot x \, dx = -\csc x + C$$

(11) Hayden

$\int (2\sin x + 3\cos x)\,dx = 2\int \sin x\,dx + 3\int \cos x\,dx =$

$-2(\cos x) + 3(\sin x)$ $\boxed{-2\cos x + 3\sin x + C}$

(12) Nicole

$\int (1 - \csc t \cot t)\,dt$

$x - (-\csc x + C)$

$\downarrow$

$x + \csc x + C$

(13) Zoe $\int (\sec^2\theta - \sin\theta)\,d\theta$

$\tan x + \cos x + C$

(14) Mateo $\int (\tan^2 y + 1)\,dy$

$\int \sec^2 y\,dy$

$\tan y + C$

① Stone

$\int (x+3)dx \quad \frac{1}{1+1}x^{1+1} + \frac{3x^{0+1}}{0+1} + C$

$\frac{x^2}{2} + 3x + C$

② Robert $\int 2x - 3x^2\,dx$

$\frac{2}{1+1}x^{1+1} - \frac{3}{1+2}x^{2+1} + C$

$x^2 - x^3 + C$

③ Alex

$\int (x^3+2)dx$

$\frac{1}{3+1}x^{3+1} + \frac{2}{1}x^{0+1} + C = \frac{1}{4}x^4 + 2x + C$

④ Alyssa

$\frac{1}{n+1}x^{n+1} + C$

$\int (x^{3/2} + 2x + 1)dx$

$\frac{1}{\frac{3}{2}+\frac{2}{2}}x^{\frac{3}{2}+\frac{2}{2}} \quad \frac{1}{1+1}2x^{1+1} \quad \frac{1}{2}(2x^2) \quad \frac{1}{0+1}(1)^{0+1}$

$= 1 \qquad \frac{1}{1}\cdot 1 = 1$

$\frac{1}{\frac{5}{2}}x^{\frac{5}{2}} + x^2 + x + C$

$\frac{2}{5}x^{\frac{5}{2}} + x^2 + x + C$

⑤ JeVon $\int \sqrt[3]{x^2}\,dx$

$x^{\frac{2}{3}} \quad \frac{1}{\frac{2}{3}+\frac{3}{3}}x^{\frac{2}{3}+\frac{3}{3}}$

$\frac{3}{5}\sqrt[3]{x^5} + C$

⑥ Carson $\int \frac{1}{x^3}dx = \int x^{-3}$

$\int x^{-3} \to \frac{1}{-2}x^{-2} \to -\frac{1}{2x^2} + C$

$-\frac{1}{2x^2} + C$

JeVon says "Good job Carson!"

⑦ Diana $\frac{x^2+x+1}{\sqrt{x}}dx$

$\int \left(\frac{x^2}{\sqrt{x}} + \frac{x}{\sqrt{x}} + \frac{1}{\sqrt{x}}\right)dx$

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

$x^{2-\frac{1}{2}} + x^{1-\frac{1}{2}} + x^{1-\frac{1}{2}}$

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

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

$\frac{2}{5}x^{\frac{5}{2}} + \frac{2}{3}x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + C$

⑧ Carli $\int (x+1)(3x-2)\,dx$

$\int (3x^2 - 2x + 3x - 2)dx$

$3x^2 + x - 2$

$3x^{2+1} + x^{1+1} - 2x^{0+1}$

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

$x^3 + \frac{x^2}{2} - 2x + C$

"Love it" Ba da Bup Ba dah.

⑨ Easton $\int y^2\sqrt{y}\,dy$

$y^{4/2} \quad y^{1/2} \quad dy$

$y^{5/2+2/2}$

$\frac{1}{\frac{5}{2}+\frac{2}{2}}$

good

$y^{7/2}$

$\frac{1}{\frac{7}{2}}$

$\frac{2y^{7/2}}{7} + C$

⑩ Hannah

$\int dx = x + C$

hi Mr. Ruger ☺ HELLO