# Алғашқы интеграл деген не?

$F'(x)=f(x)$

$F(x)+C$

$\int f(x)\mathrm{d}x$

$\int$

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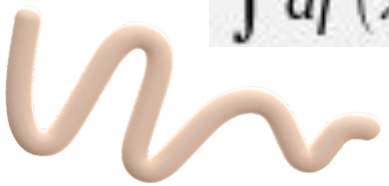
$$\left(\int f(x)dx\right)'=f(x)$$

$$\int af(x)dx=a\int f(x)dx$$

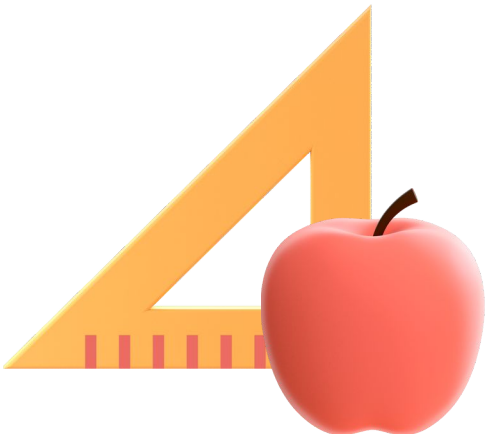


$$d\left(\int f(x)dx\right)=f(x)dx$$

$$\int (f(x)\pm g(x))dx=\int f(x)dx\pm\int g(x)dx$$

$$\int dF(x)=F(x)+c$$

# Анықталмаған интегралдың негізгі таблицасы



1. $\int 0 \cdot du = C$

2. $\int 1 \cdot du = u + C$

3. $\int u^{\alpha} du = \frac{u^{\alpha+1}}{\alpha+1} + C$ (бұндағы $\alpha$ -кез келген -1-ге тең емес нақты сан)

4. $\int \frac{du}{u} = \ln|u| + C$ ($u \neq 0$ болатын әрбір аралықта)

5. $\int a^u du = e^u + C$ (бұндағы $\alpha$ мына шарттарды қанағаттандыруы шарт: $a > 0$ және $\alpha \neq 1$)

6. $\int e^u du = e^u + C$

7. $\int \cos u du = \sin u + C$

8. $\int \sin u du = -\cos u + C$

9. $\int \frac{du}{\cos^2 u} = tgu + C$ ($\cos u \neq 0$ болатын әрбір аралықта)

10. $\int \frac{du}{\sin^2 u} = tgu + C$ ($\sin u \neq 0$ болатын әрбір аралықта)

11. $\int tgudu = -\ln|\cos u| + C$ ($\cos u \neq 0$ болатын әрбір аралықта)

12. $\int ctgudu = \ln|\sin u| + C$ ($\sin u \neq 0$ болатын әрбір аралықта)

13. $\int \frac{du}{\sin u} = \ln\left|tg\frac{u}{2}\right| + C$ ($\sin u \neq 0$ болатын әрбір аралықта)

14. $\int \frac{du}{\cos u} = \ln\left|tg\left(\frac{u}{2} + \frac{\pi}{u}\right)\right| + C$ ($\cos u \neq 0$ болатын әрбір аралықта)

15. $\int \frac{du}{\sqrt{u^2 \pm a^2}} \ln\left|u + \sqrt{u^2 \pm a^2}\right|$ ($u^2 \pm a^2 \neq 0$ болатын әрбір аралықта)

16. $\int \frac{du}{\sqrt{u^2 - a^2}} = \ln\left|\frac{u-a}{u+a}\right| + C$ ($u \neq a$ және $a \neq 0$ болатын әрбір аралықта)

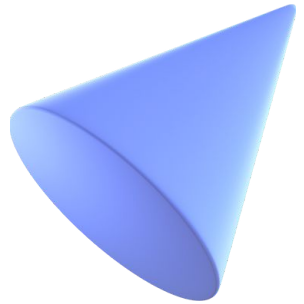
17. $\int \frac{du}{a^2 - u^2} = \frac{1}{a} arctg\frac{\overline{u}}{a} + C = -arctg\frac{u}{a} + C$ (нақты сан $a \neq 0$ болғанда)

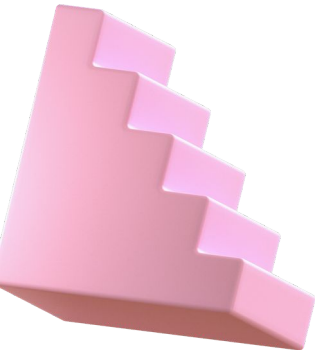
18. $\int \frac{du}{\sqrt{a^2 - u^2}} = \arcsin\frac{u}{a} + C = -\arccos\frac{u}{a} + C$ ($a \neq 0$ нақты $|u| < |a|$ болатын әрбір аралықты)

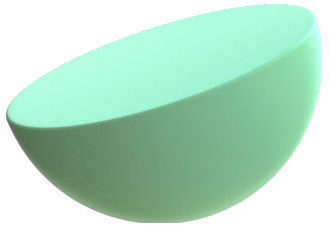
# Мысалдар

Есептер шығарып тақырыпты бекітейік

$$\int \frac{3 - 2x^4 + \sqrt[3]{x^2}}{\sqrt[4]{x}}$$







# ШЕШУ I:

$\int(f(x) \qquad \int f(x)dx \pm \int \varphi(x)dx$

$\int \alpha f(x)dx = \alpha \int f(x)dx,$ (a = const),

қасиеттерін, сонымен қоса негізгі анықталмаған интегралдардың кестесін қолдансақ:

$$\int \frac{3-2x^4+\sqrt[3]{x^2}}{\sqrt[4]{x}}dx = 3\int x^{-\frac{1}{4}}dx - 2\int x^{\frac{15}{4}}dx + \int x^{\frac{5}{12}}dx = \left|\int x^n dx = \frac{x^{n+1}}{n}c\right| = 4x^{\frac{3}{4}} - \frac{8}{19}x^{\frac{19}{4}} + \frac{12}{17}x^{\frac{17}{12}} + x^{\frac{5}{12}}.$$

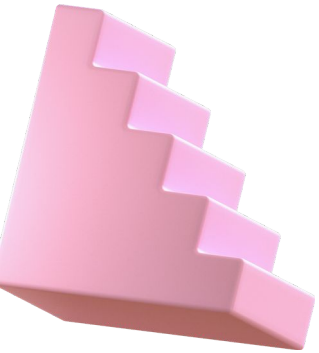
Алынған нәтижені тексерейік:

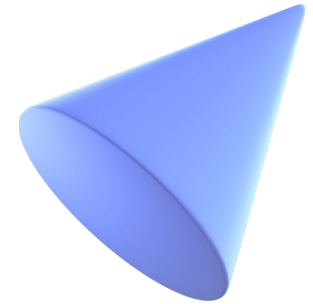
$$\left(4x^{\frac{3}{4}} - \frac{8}{19}x^{\frac{19}{4}} + \frac{12}{17}x^{\frac{17}{12}} + c\right)' = 3x^{-\frac{1}{4}} - \frac{8}{19}*\frac{19}{4}x^{\frac{15}{4}} + \frac{12}{17}*\frac{17}{12}x^{\frac{5}{12}} = 3x^{-\frac{1}{4}} - 2x^{\frac{15}{4}} + x^{\frac{5}{12}}.$$

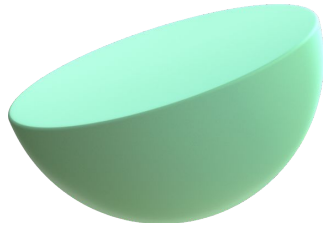
$$\int \frac{dx}{\sqrt[5]{(4-8x)^2}}$$

$$\int f(x)dx = F(x) + c$$

$$\int f(ax+b)dx = \frac{1}{a}F(ax+b) + c$$

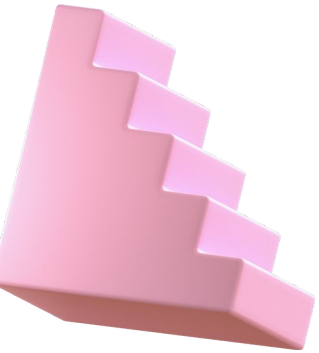


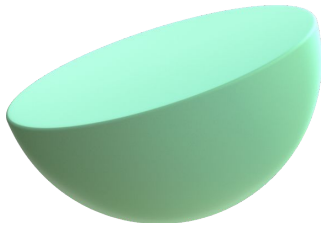




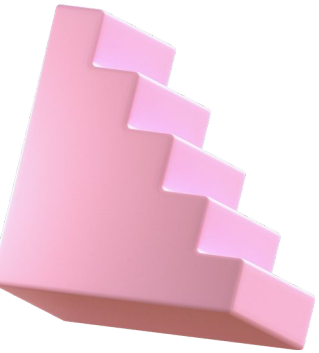
$$\int \frac{dx}{\sqrt[5]{(4-8x)^2}} = \int (4-8x)^{-\frac{2}{5}} dx = -\frac{5}{8*3}(4-8x)^{\frac{2}{5}} + c = -\frac{5}{24}\sqrt[5]{(4-8x)^3} + c$$

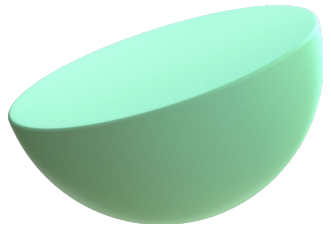
$$\left(-\frac{5}{24}(4-8x)^{\frac{3}{5}} + c\right)' = -\frac{5}{24} * \frac{3}{5}(4-8x)^{-\frac{2}{5}} * (-8) = (4-8x)^{-\frac{2}{5}}$$





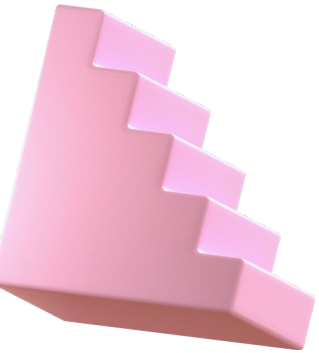
$$\int \frac{dx}{6-7x} = -\frac{1}{7}\ln|6-7x| + c$$

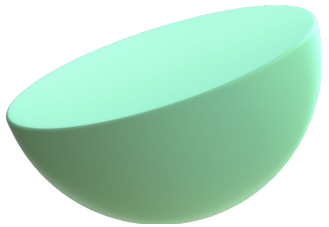


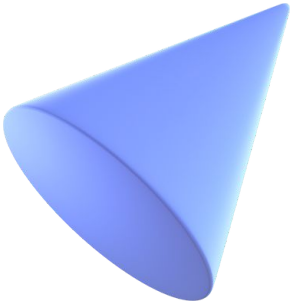


$$\left(-\frac{1}{7}\ln\left|6-7x\right|+c\right)'=-\frac{1}{7}*\frac{1}{6-7x}(-7)=\frac{1}{6-7x}$$

$$\int \cos(2-5x)dx$$

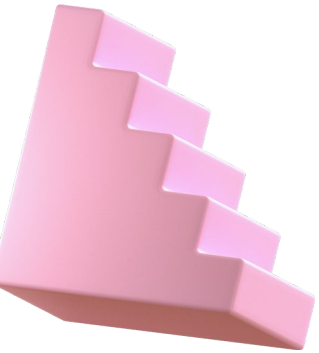


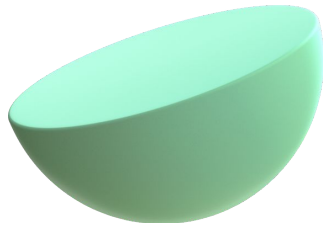




$$\int \frac{3dx}{\sqrt{4x^2-3}} = \frac{3}{2}\int \frac{dx}{\sqrt{(2x)^2-(\sqrt{3})^2}} = \frac{3}{2}\ln\left|2x-\sqrt{4x^2-3}\right| + c.$$

$$\left(\frac{3}{2}\ln\left|2x-\sqrt{4x^2-3}\right| + c\right)' = \frac{3}{2}\left(\frac{2+\frac{8x}{2\sqrt{4x^2-3}}}{2x-\sqrt{4x^2-3}}\right) = \frac{3}{2} * \frac{2(\sqrt{4x^2-3}+2x)}{(2x+\sqrt{4x^2-3})\sqrt{4x^{2-3}}} = \frac{3}{\sqrt{4x^2-3}}$$





# Назарларыңызға рахмет!

Құрметпен #3 топ оқушылары