Интеграл

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агуулга

Жишээ $\int_0^1 xe^x \, dx$

Жишээ $\int_0^1 xe^x \, dx$

$$\int_0^1 xe^x \, dx \quad =$$

Жишээ $\int_0^1 xe^x\, dx$

$$\int_0^1 xe^x\, dx = \int_0^1 u(x)v'(x)\, dx$$

Жишээ $\int_0^1 xe^x \, dx$

$$\int_0^1 xe^x \, dx = \int_0^1 u(x)v'(x) \, dx$$

$$u = x$$

$$v' = e^x$$

Жишээ $\int_0^1 xe^x \; dx$

$$\int_0^1 xe^x \; dx \quad = \quad \int_0^1 u(x)v'(x) \; dx$$

$u = x \qquad u' = 1$

$v' = e^x$

Жишээ $\int_0^1 xe^x \, dx$

$$\int_0^1 xe^x \, dx \quad = \quad \int_0^1 u(x)v'(x) \, dx$$

$u = x \qquad u' = 1$

$v' = e^x \qquad v = e^x$

Жишээ $\int_0^1 xe^x \, dx$

$$\int_0^1 xe^x \, dx = \int_0^1 u(x)v'(x) \, dx$$

$$= \left[u(x)v(x)\right]_0^1 - \int_0^1 u'(x)v(x) \, dx$$

$u = x \quad u' = 1$

$v' = e^x \quad v = e^x$

Жишээ $\int_0^1 xe^x \, dx$

$$\begin{aligned}\int_0^1 xe^x \, dx &= \int_0^1 u(x)v'(x) \, dx \\ &= \big[u(x)v(x)\big]_0^1 - \int_0^1 u'(x)v(x) \, dx \\ &= \big[xe^x\big]_0^1 \; - \int_0^1 1 \cdot e^x \, dx\end{aligned}$$

$u = x \quad u' = 1$

$v' = e^x \quad v = e^x$

Жишээ $\int_0^1 xe^x\, dx$

$$\begin{aligned}\int_0^1 xe^x\, dx &= \int_0^1 u(x)v'(x)\, dx \\ &= \left[u(x)v(x)\right]_0^1 - \int_0^1 u'(x)v(x)\, dx \\ &= \left[xe^x\right]_0^1 \; - \int_0^1 1\cdot e^x\, dx \\ &= \left(1\cdot e^1 - 0\cdot e^0\right) -\end{aligned}$$

$u = x \quad u' = 1$

$v' = e^x \quad v = e^x$

Жишээ $\int_0^1 xe^x\,dx$

$$\begin{aligned}
\int_0^1 xe^x\,dx &= \int_0^1 u(x)v'(x)\,dx \\
&= \big[u(x)v(x)\big]_0^1 - \int_0^1 u'(x)v(x)\,dx \\
&= \big[xe^x\big]_0^1 - \int_0^1 1\cdot e^x\,dx \\
&= \left(1\cdot e^1 - 0\cdot e^0\right) - \big[e^x\big]_0^1
\end{aligned}$$

$u = x \quad u' = 1$

$v' = e^x \quad v = e^x$

Жишээ $\int_0^1 xe^x\,dx$

$$
\begin{aligned}
\int_0^1 xe^x\,dx &= \int_0^1 u(x)v'(x)\,dx \\
&= \Big[u(x)v(x)\Big]_0^1 - \int_0^1 u'(x)v(x)\,dx \\
&= \Big[xe^x\Big]_0^1 - \int_0^1 1\cdot e^x\,dx \\
&= \left(1\cdot e^1 - 0\cdot e^0\right) - \Big[e^x\Big]_0^1 \\
&= e - \left(e^1 - e^0\right)
\end{aligned}
$$

$u = x$ $\quad$ $u' = 1$

$v' = e^x$ $\quad$ $v = e^x$

Жишээ $\int_0^1 xe^x \, dx$

$$\begin{aligned}
\int_0^1 xe^x \, dx &= \int_0^1 u(x)v'(x) \, dx \\
&= \left[u(x)v(x)\right]_0^1 - \int_0^1 u'(x)v(x) \, dx \\
&= \left[xe^x\right]_0^1 \; - \; \int_0^1 1 \cdot e^x \, dx \\
&= \left(1 \cdot e^1 - 0 \cdot e^0\right) - \left[e^x\right]_0^1 \\
&= e - (e^1 - e^0) \\
&= 1
\end{aligned}$$

$$u = x \qquad u' = 1$$

$$v' = e^x \qquad v = e^x$$

Жишээ $\int_1^e x \ln x \, dx$

Жишээ $\int_1^e x \ln x \, dx$

$$\int_1^e \ln x \cdot x \, dx$$

Жишээ $\int_1^e x \ln x \, dx$

$$\int_1^e \ln x \cdot x \, dx \;=\; \int_1^e uv'$$

Жишээ $\int_1^e x \ln x \, dx$

$$\int_1^e \ln x \cdot x \, dx \quad = \quad \int_1^e uv'$$

$$u = \ln x$$

$$v' = x$$

Жишээ $\int_1^e x \ln x \, dx$

$$\int_1^e \ln x \cdot x \, dx = \int_1^e uv'$$

$u = \ln x \quad u' = \frac{1}{x}$

$v' = x$

Жишээ $\int_1^e x \ln x \, dx$

$$\int_1^e \ln x \cdot x \, dx \quad = \quad \int_1^e uv'$$

$$u = \ln x \quad u' = \frac{1}{x}$$

$$v' = x \quad v = \frac{x^2}{2}$$

Жишээ $\int_1^e x \ln x \, dx$

$$\int_1^e \ln x \cdot x \, dx \quad = \quad \int_1^e uv' = \left[uv\right]_1^e - \int_1^e u'v$$

$$u = \ln x \qquad u' = \frac{1}{x}$$

$$v' = x \qquad v = \frac{x^2}{2}$$

Жишээ $\int_1^e x \ln x \, dx$

$$\int_1^e \ln x \cdot x \, dx = \int_1^e uv' = \left[uv\right]_1^e - \int_1^e u'v$$

$$= \left[\ln x \cdot \frac{x^2}{2}\right]_1^e - \int_1^e \frac{1}{x}\frac{x^2}{2} \, dx$$

$u = \ln x \quad u' = \frac{1}{x}$

$v' = x \quad v = \frac{x^2}{2}$

Жишээ $\int_1^e x \ln x \, dx$

$$\int_1^e \ln x \cdot x \, dx = \int_1^e uv' = [uv]_1^e - \int_1^e u'v$$

$$= \left[\ln x \cdot \frac{x^2}{2}\right]_1^e - \int_1^e \frac{1}{x}\frac{x^2}{2} \, dx$$

$$= \left(\ln e \frac{e^2}{2} - \ln 1 \frac{1^2}{2}\right) -$$

$u = \ln x \quad u' = \frac{1}{x}$

$v' = x \quad v = \frac{x^2}{2}$

Жишээ $\int_1^e x \ln x \, dx$

$$\begin{aligned}\int_1^e \ln x \cdot x \, dx &= \int_1^e uv' = \left[uv\right]_1^e - \int_1^e u'v \\ &= \left[\ln x \cdot \frac{x^2}{2}\right]_1^e - \int_1^e \frac{1}{x}\frac{x^2}{2} \, dx \\ &= \left(\ln e \frac{e^2}{2} - \ln 1 \frac{1^2}{2}\right) - \frac{1}{2}\int_1^e x \, dx\end{aligned}$$

$$u = \ln x \qquad u' = \frac{1}{x}$$

$$v' = x \qquad v = \frac{x^2}{2}$$

Жишээ $\int_1^e x \ln x \, dx$

$$\begin{aligned}
\int_1^e \ln x \cdot x \, dx &= \int_1^e uv' = \left[uv\right]_1^e - \int_1^e u'v \\
&= \left[\ln x \cdot \tfrac{x^2}{2}\right]_1^e - \int_1^e \tfrac{1}{x}\tfrac{x^2}{2} \, dx \\
&= \left(\ln e \tfrac{e^2}{2} - \ln 1 \tfrac{1^2}{2}\right) - \tfrac{1}{2}\int_1^e x \, dx \\
&= \tfrac{e^2}{2} - \tfrac{1}{2}\left[\tfrac{x^2}{2}\right]_1^e
\end{aligned}$$

$u = \ln x \quad u' = \frac{1}{x}$

$v' = x \quad v = \frac{x^2}{2}$

Жишээ $\int_1^e x \ln x \, dx$

$$\begin{aligned}
\int_1^e \ln x \cdot x \, dx &= \int_1^e uv' = [uv]_1^e - \int_1^e u'v \\
&= \left[\ln x \cdot \tfrac{x^2}{2}\right]_1^e - \int_1^e \tfrac{1}{x}\tfrac{x^2}{2} \, dx \\
&= \left(\ln e \tfrac{e^2}{2} - \ln 1 \tfrac{1^2}{2}\right) - \tfrac{1}{2}\int_1^e x \, dx \\
&= \tfrac{e^2}{2} - \tfrac{1}{2}\left[\tfrac{x^2}{2}\right]_1^e \\
&= \tfrac{e^2}{2} - \tfrac{e^2}{4} + \tfrac{1}{4} = \tfrac{e^2+1}{4}
\end{aligned}$$

$u = \ln x \quad u' = \frac{1}{x}$

$v' = x \quad v = \frac{x^2}{2}$

Жишээ $\int \arcsin x \, dx$

Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx$$

Жишээ $\int x^2 e^x \; dx$

Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx$$

$$u = \arcsin x, \; v' = 1$$

Жишээ $\int x^2 e^x \; dx$

- $\displaystyle\int x^2 e^x \; dx$
- $\displaystyle\int x e^x \; dx$

Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx$$

$$u = \arcsin x, \; v' = 1 \quad \left(u' = \tfrac{1}{\sqrt{1-x^2}} \; v = x \right)$$

Жишээ $\int x^2 e^x \; dx$

- $\displaystyle\int x^2 e^x \; dx$
- $\displaystyle\int x e^x \; dx = \left[x e^x \right] - \int e^x \; dx$

Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx = \left[x \arcsin x\right] - \int \frac{x}{\sqrt{1-x^2}} \; dx$$

$$u = \arcsin x, \; v' = 1 \;\; \left(\; u' = \tfrac{1}{\sqrt{1-x^2}} \;\; v = x \right)$$

Жишээ $\int x^2 e^x \; dx$

- $\displaystyle\int x^2 e^x \; dx$
- $\displaystyle\int x e^x \; dx = \left[x e^x\right] - \int e^x \; dx = (x-1)e^x + c$

Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx = \left[x \arcsin x\right] - \int \frac{x}{\sqrt{1-x^2}} \; dx$$

$$= \left[x \arcsin x\right] - \left[-\sqrt{1-x^2}\right]$$

$$u = \arcsin x, \; v' = 1 \;\; \left(u' = \frac{1}{\sqrt{1-x^2}} \;\; v = x \right)$$

Жишээ $\int x^2 e^x \; dx$

- $\displaystyle\int x^2 e^x \; dx$
- $\displaystyle\int x e^x \; dx = \left[x e^x\right] - \int e^x \; dx = (x-1)e^x + c$
- $\displaystyle\int x^2 e^x \; dx = (x^2 - 2x + 2)e^x + c$

Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx = \left[x \arcsin x\right] - \int \frac{x}{\sqrt{1-x^2}} \; dx$$

$$= \left[x \arcsin x\right] - \left[-\sqrt{1-x^2}\right] = x \arcsin x + \sqrt{1-x^2} + c$$

$$u = \arcsin x, \; v' = 1 \quad \left(u' = \frac{1}{\sqrt{1-x^2}} \; v = x \right)$$

Жишээ $\int x^2 e^x \; dx$

- $\displaystyle\int x^2 e^x \; dx$
- $\displaystyle\int x e^x \; dx = \left[x e^x\right] - \int e^x \; dx = (x-1)e^x + c$
- $\displaystyle\int x^2 e^x \; dx = (x^2 - 2x + 2)e^x + c$

Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx = \Big[x \arcsin x\Big] - \int \frac{x}{\sqrt{1-x^2}} \; dx$$

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Жишээ $\int x^2 e^x \; dx$

- $\displaystyle\int x^2 e^x \; dx$
- $\displaystyle\int x e^x \; dx = \Big[x e^x\Big] - \int e^x \; dx = (x-1)e^x + c$
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Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx = \left[x \arcsin x\right] - \int \frac{x}{\sqrt{1-x^2}} \; dx$$

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$$u = \arcsin x, \; v' = 1 \;\; \left(\; u' = \tfrac{1}{\sqrt{1-x^2}} \;\; v = x \right)$$

Жишээ $\int x^2 e^x \; dx$

- $\displaystyle\int x^2 e^x \; dx$
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Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx = \left[x \arcsin x\right] - \int \frac{x}{\sqrt{1-x^2}} \; dx$$

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$$u = \arcsin x, \; v' = 1 \quad (\; u' = \tfrac{1}{\sqrt{1-x^2}} \;\; v = x)$$

Жишээ $\int x^2 e^x \; dx$

- $\int x^2 e^x \; dx$ $\qquad u = x^2 v' = e^x$
- $\int x e^x \; dx = \left[x e^x\right] - \int e^x \; dx = (x-1)e^x + c$
- $\int x^2 e^x \; dx = (x^2 - 2x + 2)e^x + c$

Жишээ $\int \arcsin x \; dx$

$$\int 1 \cdot \arcsin x \; dx = \left[x \arcsin x\right] - \int \frac{x}{\sqrt{1-x^2}} \; dx$$

$$= \left[x \arcsin x\right] - \left[-\sqrt{1-x^2}\right] = x \arcsin x + \sqrt{1-x^2} + c$$

$$u = \arcsin x, \; v' = 1 \quad \left(u' = \frac{1}{\sqrt{1-x^2}} \; v = x \right)$$

Жишээ $\int x^2 e^x \; dx$

- $\displaystyle\int x^2 e^x \; dx = \left[x^2 e^x\right] - 2\int x e^x \; dx \qquad u = x^2 v' = e^x$
- $\displaystyle\int x e^x \; dx = \left[x e^x\right] - \int e^x \; dx = (x-1)e^x + c$
- $\displaystyle\int x^2 e^x \; dx = (x^2 - 2x + 2)e^x + c$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\, dx$$

- $u = \varphi(x) = 1 - x^2$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\,dx = -2x\,dx$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\, dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\, dx = -2x\, dx$

$$\int \quad \frac{x\, dx}{(1-x^2)^{3/2}}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\,dx = -2x\,dx$

$$\int \quad \frac{x\,dx}{(1-x^2)^{3/2}} = \int \quad \frac{-\frac{1}{2}\,du}{u^{3/2}}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\,dx = -2x\,dx$
- $x = 0 \;\; u = \varphi(0) = 1$

$$\int \quad \frac{x\,dx}{(1-x^2)^{3/2}} = \int \quad \frac{-\frac{1}{2}\,du}{u^{3/2}}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\,dx = -2x\,dx$
- $x = 0 \;\; u = \varphi(0) = 1$

$$\int_0 \quad \frac{x\,dx}{(1-x^2)^{3/2}} = \int \quad \frac{-\frac{1}{2}\,du}{u^{3/2}}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\, dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\, dx = -2x\, dx$
- $x = 0 \; u = \varphi(0) = 1$

$$\int_0 \frac{x\, dx}{(1-x^2)^{3/2}} = \int_1 \frac{-\frac{1}{2}\, du}{u^{3/2}}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\, dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\, dx = -2x\, dx$
- $x = 0 \;\; u = \varphi(0) = 1$
- $x = \frac{1}{2} \;\; u = \varphi(\frac{1}{2}) = \frac{3}{4}$

$$\int_0 \quad \frac{x\, dx}{(1-x^2)^{3/2}} = \int_1 \quad \frac{-\frac{1}{2}\, du}{u^{3/2}}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\,dx = -2x\,dx$
- $x = 0 \;\; u = \varphi(0) = 1$
- $x = \frac{1}{2} \;\; u = \varphi(\frac{1}{2}) = \frac{3}{4}$

$$\int_0^{1/2} \frac{x\,dx}{(1-x^2)^{3/2}} = \int_1 \quad \frac{-\frac{1}{2}\,du}{u^{3/2}}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\, dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\, dx = -2x\, dx$
- $x = 0 \;\; u = \varphi(0) = 1$
- $x = \frac{1}{2} \;\; u = \varphi(\frac{1}{2}) = \frac{3}{4}$

$$\int_0^{1/2} \frac{x\, dx}{(1-x^2)^{3/2}} = \int_1^{3/4} \frac{-\frac{1}{2}\, du}{u^{3/2}}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\,dx = -2x\,dx$
- $x = 0 \;\; u = \varphi(0) = 1$
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$$\int_0^{1/2} \frac{x\,dx}{(1-x^2)^{3/2}} = \int_1^{3/4} \frac{-\frac{1}{2}\,du}{u^{3/2}} = -\frac{1}{2}\int_1^{3/4} u^{-3/2}\,du$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\,dx = -2x\,dx$
- $x = 0 \;\; u = \varphi(0) = 1$
- $x = \frac{1}{2} \;\; u = \varphi(\frac{1}{2}) = \frac{3}{4}$

$$\int_0^{1/2} \frac{x\,dx}{(1-x^2)^{3/2}} = \int_1^{3/4} \frac{-\frac{1}{2}\,du}{u^{3/2}} = -\frac{1}{2}\int_1^{3/4} u^{-3/2}\,du$$

$$= -\frac{1}{2}\Big[-2u^{-1/2}\Big]_1^{3/4}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\, dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\, dx = -2x\, dx$
- $x = 0 \;\; u = \varphi(0) = 1$
- $x = \frac{1}{2} \;\; u = \varphi(\frac{1}{2}) = \frac{3}{4}$

$$\int_0^{1/2} \frac{x\, dx}{(1-x^2)^{3/2}} = \int_1^{3/4} \frac{-\frac{1}{2}\, du}{u^{3/2}} = -\frac{1}{2}\int_1^{3/4} u^{-3/2}\, du$$

$$= -\frac{1}{2}\big[-2u^{-1/2}\big]_1^{3/4} = \big[\frac{1}{\sqrt{u}}\big]_1^{3/4}$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\, dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\, dx = -2x\, dx$
- $x = 0 \;\; u = \varphi(0) = 1$
- $x = \frac{1}{2} \;\; u = \varphi(\frac{1}{2}) = \frac{3}{4}$

$$\int_0^{1/2} \frac{x\, dx}{(1-x^2)^{3/2}} = \int_1^{3/4} \frac{-\frac{1}{2}\, du}{u^{3/2}} = -\frac{1}{2}\int_1^{3/4} u^{-3/2}\, du$$

$$= -\frac{1}{2}\Big[-2u^{-1/2}\Big]_1^{3/4} = \Big[\frac{1}{\sqrt{u}}\Big]_1^{3/4} = \frac{1}{\sqrt{\frac{3}{4}}} - 1$$

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Жишээ

$$\int_0^{1/2} \frac{x}{(1-x^2)^{3/2}}\,dx$$

- $u = \varphi(x) = 1 - x^2$
- $du = \varphi'(x)\,dx = -2x\,dx$
- $x = 0 \;\; u = \varphi(0) = 1$
- $x = \frac{1}{2} \;\; u = \varphi(\frac{1}{2}) = \frac{3}{4}$

$$\int_0^{1/2} \frac{x\,dx}{(1-x^2)^{3/2}} = \int_1^{3/4} \frac{-\frac{1}{2}\,du}{u^{3/2}} = -\frac{1}{2}\int_1^{3/4} u^{-3/2}\,du$$

$$= -\frac{1}{2}\big[-2u^{-1/2}\big]_1^{3/4} = \big[\frac{1}{\sqrt{u}}\big]_1^{3/4} = \frac{1}{\sqrt{\frac{3}{4}}} - 1 = \frac{2}{\sqrt{3}} - 1$$

Жишээ

$$\int_0^{1/2} \frac{1}{(1-x^2)^{3/2}}\,dx$$

Жишээ

$$\int_0^{1/2} \frac{1}{(1-x^2)^{3/2}}\, dx$$

- $x = \varphi(t) = \sin t$

Жишээ

$$\int_0^{1/2} \frac{1}{(1-x^2)^{3/2}}\, dx$$

- $x = \varphi(t) = \sin t \quad 1 - x^2 = \cos^2 t$

Жишээ

$$\int_0^{1/2} \frac{1}{(1-x^2)^{3/2}}\,dx$$

- $x = \varphi(t) = \sin t \qquad 1 - x^2 = \cos^2 t$
- $dx = \cos t\; dt$

Жишээ

$$\int_0^{1/2} \frac{1}{(1-x^2)^{3/2}}\, dx$$

- $x = \varphi(t) = \sin t \quad 1 - x^2 = \cos^2 t$
- $dx = \cos t \; dt$
- $t = \arcsin x \;\; x = 0 \;\; t = \arcsin(0) = 0$

Жишээ

$$\int_0^{1/2} \frac{1}{(1-x^2)^{3/2}}\, dx$$

- $x = \varphi(t) = \sin t \quad 1 - x^2 = \cos^2 t$
- $dx = \cos t\ dt$
- $t = \arcsin x\ \ x = 0\ \ t = \arcsin(0) = 0$
- $x = \frac{1}{2}\ \ t = \arcsin(\frac{1}{2}) = \frac{\pi}{6}$

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$$f(x) = \frac{x+1}{2x^2+x+1} = \frac{1}{4} \cdot \frac{4x+1}{2x^2+x+1} + \frac{3}{4} \cdot \frac{1}{2x^2+x+1}$$

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2. $\int f(x)\,dx$

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2. $\int f(x)\, dx = \frac{1}{4} \ln\left(2x^2 + x + 1\right) + \frac{3}{2\sqrt{7}} \arctan\left(\frac{4}{\sqrt{7}}\left(x + \frac{1}{4}\right)\right) + c$

Жишээ $I_2 = \int \frac{du}{(u^2+1)^2}$

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$I_2 = \frac{1}{2} I_1 + \frac{1}{2}\frac{u}{u^2+1} + c$

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$I_2 = \frac{1}{2} I_1 + \frac{1}{2}\frac{u}{u^2+1} + c$

$I_1 = arctgu$

Жишээ $I_2 = \int \frac{du}{(u^2+1)^2}$

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Жишээ $\int \frac{\cos x \, dx}{2-\cos^2 x}$

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$\int \frac{\cos x \, dx}{2-\cos^2 x} = \int \frac{\cos x \, dx}{1+\sin^2 x} = \int \frac{du}{1+u^2}$

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$\int \frac{\cos x \; dx}{2-\cos^2 x} = \int \frac{\cos x \; dx}{1+\sin^2 x} = \int \frac{du}{1+u^2} = \left[arctgu \right] = arctg(\sin x) + c$

Жишээ

$t = tg\frac{x}{2}$
$[-\frac{\pi}{2}, 0]$ $[-1, 0]$

$$\int_{-\frac{\pi}{2}}^{0} \frac{dx}{1 - \sin x}$$

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Жишээ

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$$= 2\int_{-1}^{0} \frac{dt}{(1-t)^2}$$

Жишээ

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$$= 2\int_{-1}^{0} \frac{dt}{(1-t)^2} = 2\left[\frac{1}{1-t}\right]_{-1}^{0} = 2(1 - \frac{1}{2})$$

Жишээ

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$$= 2\int_{-1}^{0} \frac{dt}{(1-t)^2} = 2\left[\frac{1}{1-t}\right]_{-1}^{0} = 2(1 - \frac{1}{2}) = 1$$