Домашнее задание 10.

Задание 10.1

$\int(2x^2-2x-1+\sin x-\cos x+\ln x+e^x)dx=$

$=2\cdot\frac{x^3}{3}-2\cdot\frac{x^2}{2}-x-\cos x-\sin x+e^x+\int\ln x\,dx=$

$u=\ln x;\quad du=\frac{dx}{x};$

$dV=dx;\quad V=x;$

$=\frac{2}{3}x^3-x^2-x-\cos x-\sin x+e^x+\ln x\cdot x-\int dx=$

$=\frac{2}{3}x^3-x^2-x-\cos x-\sin x+e^x+\ln x\cdot x-x+C=$

$=\frac{2}{3}x^3-x^2-2x+\ln x\cdot x-\cos x-\sin x+e^x+C.$

Задание 10.2

$\int(2x+6xz^2-5x^2y-3\ln z)dx=\overset{1}{\cancel{2}}\cdot\frac{x^2}{\underset{1}{\cancel{2}}}+\overset{3}{\cancel{6}}z^2\cdot\frac{x^2}{\overset{1}{\cancel{2}}}-$

$-5y\cdot\frac{x^3}{3}-3\ln(z)\cdot x+C=(1+3z^2)x^2-\frac{5}{3}yx^3-3\ln(z)x+C$

Задание 10.3

$\int_0^\pi 3x^2\sin 2x\,dx=\left(-\frac{3}{2}x^2\cdot\cos 2x+\int\frac{1}{\cancel{2}}\cos 2x\cdot\overset{3}{\cancel{6}}x\,dx\right)\Big|_0^\pi=$

$u_1=3x^2;\quad du_1=6x\,dx;\quad u_2=3x;\quad du_2=3dx;$

$dV_1=\sin 2x\,dx;\quad V_1=\frac{1}{2}\cos 2x;\quad dV_2=\cos 2x\,dx;\quad V_2=\frac{1}{2}\sin 2x;$

$=\left(-\frac{3}{2}x^2\cdot\cos 2x+\frac{3}{2}x\sin 2x-\int\frac{1}{2}\sin 2x\cdot 3dx\right)\Big|_0^\pi=$

$=\left(-\frac{3}{2}x^2\cdot\cos 2x+\frac{3}{2}x\sin 2x-\frac{3}{4}\int\sin 2x\,d2x\right)\Big|_0^\pi=$

$=\left(-\frac{3}{2}x^2\cdot\cos 2x+\frac{3}{2}x\sin 2x+\frac{3}{4}\cos 2x\right)\Big|_0^\pi=$

$=-\frac{3}{2}\pi^2\cdot\cos 2\pi+\frac{3}{2}\pi\sin 2\pi+\frac{3}{4}\cos 2\pi-\frac{3}{4}\cos 0=$

$=-1{,}5\pi^2+\cancel{0}+0{,}\cancel{75}-0{,}\cancel{75}=-1{,}5\pi^2.$

Задание 10.4

$\int\frac{1}{\sqrt{x+1}}dx=\int(x+1)^{-0{,}5}d(x+1)=\frac{(x+1)^{0{,}5}}{0{,}5}+C=$

$=2\sqrt{x+1}+C.$