ДЗ-1

№1635

$$\int \frac{(1-x)^3}{x\sqrt[3]{x}}\,dx = \int \frac{1-3x+3x^2-x^3}{x^{\frac{4}{3}}}\,dx =$$

$$= \int x^{-\frac{4}{3}}\,dx - 3\int x^{-\frac{1}{3}}\,dx + 3\int x^{\frac{2}{3}}\,dx - \int x^{\frac{5}{3}}\,dx =$$

$$= \frac{x^{-\frac{1}{3}}}{-\frac{1}{3}} - 3\cdot\frac{x^{\frac{2}{3}}}{\frac{2}{3}} + 3\,\frac{x^{\frac{5}{3}}}{\frac{5}{3}} - \frac{x^{\frac{8}{3}}}{\frac{8}{3}} + C =$$

$$= -\frac{3}{\sqrt[3]{x}} - \frac{9}{2}\sqrt[3]{x^2} + \frac{9}{5}\sqrt[3]{x^5} - \frac{3}{8}\sqrt[3]{x^8} + C$$

№1637

$$\int \frac{(\sqrt{2x}-\sqrt[3]{3x})^2}{x}\,dx = \int \frac{2x - 2\sqrt{2x}\sqrt[3]{3x} + \sqrt[3]{9x^2}}{x}\,dx =$$

$$= \int 2\,dx - 2\sqrt{2}\sqrt[3]{3}\int x^{-\frac{1}{6}}\,dx + \sqrt[3]{9}\int x^{-\frac{1}{3}}\,dx =$$

$$= 2x - \frac{12\sqrt{2}\sqrt[3]{3}}{5}\sqrt[6]{x^5} + \frac{3\sqrt[3]{9}}{2}\sqrt[3]{x^2} + C$$

№1641

$$\int \frac{x^2+3}{x^2-1}\,dx = \int 1\,dx + 4\int \frac{dx}{x^2-1} = x + 2\ln\left|\frac{x-1}{x+1}\right| + C$$

№1659

$$\int \frac{dx}{(5x-2)^{\frac{5}{2}}} = \frac{1}{5}\int \frac{d(5x-2)}{(5x-2)^{\frac{5}{2}}} = \frac{1}{5}\left(-\frac{2}{3}\right)\cdot\frac{1}{(5x-2)^{\frac{3}{2}}} + C =$$

$$= -\frac{2}{15(5x-2)^{\frac{3}{2}}} + C$$

№ 1669

$$\int \frac{dx}{1-\cos x} = \int \frac{dx}{1-(1-2\sin^2\frac{x}{2})} = \int \frac{1}{2}\cdot\frac{dx}{\sin^2\frac{x}{2}} =$$

$$= -\operatorname{ctg}\frac{x}{2} + C$$

№ 1677

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

№ 1682

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

$$= \frac{1}{2}\int\frac{dt}{(t-1)\sqrt{t}} = \int\frac{d\sqrt{t}}{t-1} = \int\frac{ds}{s^2-1} =$$

$$= \frac{1}{2}\ln\left|\frac{s-1}{s+1}\right| + C = \frac{1}{2}\ln\left|\frac{\sqrt{t}-1}{\sqrt{t}+1}\right| = \frac{1}{2}\ln\left|\frac{\sqrt{x^2+1}-1}{\sqrt{x^2+1}+1}\right| + C$$

№ 1690

$$\int\frac{e^x\,dx}{2+e^x} = \int\frac{de^x}{2+e^x} = \ln(e^x+2) + C$$

№ 1713

$$\int\frac{x^2-1}{x^4+1}\,dx = \int\frac{\left(1-\frac{1}{x^2}\right)dx}{x^2+\frac{1}{x^2}} = \int\frac{d\left(x+\frac{1}{x}\right)}{\left(x+\frac{1}{x}\right)^2-\left(\sqrt{2}\right)^2} =$$

$$= \frac{1}{2\sqrt{2}}\ln\left|\frac{x+\frac{1}{x}-\sqrt{2}}{x+\frac{1}{x}+\sqrt{2}}\right| + C = \frac{1}{2\sqrt{2}}\ln\left|\frac{x^2-\sqrt{2}x+1}{x^2+\sqrt{2}x+1}\right| + C$$

№1730

$$\int x\sqrt{2-5x}\,dx = \int\left(\frac{1}{5}(5x-2)\sqrt{2-5x}+\frac{2}{5}\sqrt{2-5x}\right)dx =$$

$$= -\frac{1}{5}\int(2-5x)^{1,5}dx+\frac{2}{5}\int(2-5x)^{0,5}dx =$$

$$= -\frac{1}{5}\cdot\frac{(2-5x)^{2,5}}{2,5}+\frac{2}{5}\cdot\frac{(2-5x)^{1,5}}{1,5}+C =$$

$$= -\frac{2}{25}(2-5x)^{2,5}+\frac{4}{15}(2-5x)^{1,5}+C$$