Интегрирование по частям

В задачах 1832–1868 найти интегралы.

1832. $\int x\sin 2x\,dx$. **1833.** $\int x\cos x\,dx$. **1834.** $\int xe^{-x}dx$.

1835. $\int x\cdot 3^x dx$. **1836.** $\int x^n \ln x\,dx\ (n\neq -1)$.

1837. $\int x\operatorname{arctg} x dx$. **1838.** $\int \arccos x\,dx$. **1839.** $\int \operatorname{arctg}\sqrt{x}\,dx$.

1840. $\int \frac{\arcsin x}{\sqrt{x+1}}dx$. **1841.** $\int x\operatorname{tg}^2 x\,dx$. **1842.** $\int x\cos^2 x\,dx$.

1843. $\int \frac{\lg x}{x^3}dx$. **1844.** $\int \frac{x\operatorname{arctg} x}{\sqrt{1+x^2}}dx$. **1845.** $\int \frac{\arcsin\sqrt{x}}{\sqrt{1-x}}dx$.

1846. $\int \ln\left(x^2+1\right)dx$. **1847.** $\int \frac{x^2dx}{\left(1+x^2\right)^2}$.

1848. $\int \frac{x^3dx}{\sqrt{1+x^2}}$. **1849.** $\int x^2\ln(1+x)\,dx$.

1850. $\int x^2e^{-x}dx$. **1851.** $\int x^3e^x dx$. **1852.** $\int x^2a^x dx$.

1853. $\int x^3\sin x\,dx$. **1854.** $\int x^2\cos^2 x\,dx$. **1855.** $\int \ln^2 x\,dx$.

1856. $\int \frac{\ln^3 x}{x^2}dx$. **1857.** $\int \frac{\ln^3 x}{\sqrt{x^5}}dx$. **1858.** $\int (\arcsin x)^2 dx$.

1859. $\int (\operatorname{arctg} x)^2 x\,dx$. **1860.** $\int e^x\sin x\,dx$.

1861. $\int e^{3x}(\sin 2x-\cos 2x)dx$. **1862.** $\int e^{ax}\cos nx\,dx$.

1863. $\int \sin\ln x\,dx$. **1864.** $\int \cos\ln x\,dx$. **1865*.** $\int \frac{x^2dx}{\sqrt{1-x^2}}$.

1866*. $\int \sqrt{a^2+x^2}dx$. **1867.** $\int \frac{x^2e^x dx}{(x+2)^2}$. **1868.** $\int x^2e^x\sin x\,dx$.

Ответы

1832. $\frac{1}{4}\sin 2x-\frac{1}{2}x\cos 2x+C$. **1833.** $x\sin x+\cos x+C$.

1834. $C-e^{-x}(x+1)$. **1835.** $\frac{3^x}{\ln^2 3}(x\ln 3-1)+C$. **1836.** $\frac{x^{n+1}}{n+1}\left(\ln x-\frac{1}{n+1}\right)+C$.

1837. $\frac{x^2+1}{2}\operatorname{arctg} x-\frac{x}{2}+C$. **1838.** $x\arccos x-\sqrt{1-x^2}+C$.

1839. $x\operatorname{arctg}\sqrt{x}-\sqrt{x}+\operatorname{arctg}\sqrt{x}+C$.

1840. $2\sqrt{x+1}\arcsin x+4\sqrt{1-x}+C$. **1841.** $x\operatorname{tg} x-\frac{x^2}{2}+\ln|\cos x|+C$.

1842. $\frac{x^2}{4}+\frac{1}{4}x\sin 2x+\frac{1}{8}\cos 2x+C$. **1843.** $C-\frac{1}{2x^2}\lg\left(x\sqrt{e}\right)$.

1844. $\sqrt{1+x^2}\operatorname{arctg} x-\ln\left(x+\sqrt{1+x^2}\right)+C$. **1845.** $2\left(\sqrt{x}-\sqrt{1-x}\arcsin\sqrt{x}\right)+C$.

1846. $x\ln\left(x^2+1\right)-2x+2\operatorname{arctg} x+C$. **1847.** $C-\frac{x}{2\left(1+x^2\right)}+\frac{1}{2}\operatorname{arctg} x$.

1848. $x^2\sqrt{1+x^2}-\frac{2}{3}\sqrt{\left(1+x^2\right)^3}+C$.

1849. $\left(x^3+1\right)\ln(1+x)/3-x^3/9+x^2/6-x/3+C$.

1850. $C-e^{-x}\left(2+2x+x^2\right)$. **1851.** $e^x\left(x^3-3x^2+6x-6\right)+C$.

1852. $a^x\left(x^2/\ln a-2x/\ln^2 a+2/\ln^3 a\right)+C$.

1853. $C-x^3\cos x+3x^2\sin x+6x\cos x-6\sin x$.

1854. $\frac{1}{6}x^3+\frac{1}{4}x^2\sin 2x+\frac{1}{4}\cos 2x-\frac{1}{8}\sin 2x+C$.

1855. $x\left(\ln^2 x-2\ln x+2\right)+C$. **1856.** $C-\frac{1}{x}\left(\ln^3 x+3\ln^2 x+6\ln x+6\right)$.

1857. $C-\frac{8}{27\sqrt{x^3}}\left(\frac{9}{4}\ln^2 x+3\ln x+2\right)$.

1858. $x(\arcsin x)^2+2\arcsin x\cdot\sqrt{1-x^2}-2x+C$.

1859. $\frac{x^2+1}{2}(\operatorname{arctg} x)^2-x\operatorname{arctg} x+\frac{1}{2}\ln\left(1+x^2\right)+C$. **1860.** $\frac{e^x(\sin x-\cos x)}{2}+C$.

1861. $\frac{e^{3x}}{13}(\sin 2x-5\cos 2x)+C$. **1862.** $\frac{e^{ax}}{a^2+n^2}(n\sin nx+a\cos nx)+C$.

1863. $\frac{x}{2}(\sin\ln x-\cos\ln x)+C$. **1864.** $\frac{x}{2}(\cos\ln x+\sin\ln x)+C$.

1865*. $C-\frac{x}{2}\sqrt{1-x^2}+\frac{1}{2}\arcsin x$. (Положить $dv=\frac{x\,dx}{\sqrt{1-x^2}}$ и далее $\int\sqrt{1-x^2}dx$ преобразовать к виду $\int\frac{1-x^2}{\sqrt{1-x^2}}dx$.)

1866*. $\frac{x}{2}\sqrt{a^2+x^2}+\frac{a^2}{2}\ln\left(x+\sqrt{a^2+x^2}\right)+C$. (Положить $u=\sqrt{a^2+x^2}$.)

1867. $\frac{x-2}{x+2}e^x+C$. **1868.** $\frac{1}{2}\left|\left(x^2-1\right)\sin x-(x-1)^2\cos x\right|e^x+C$.