Partieel Integreren (of partieel primitiveren) Antwoorden

1. $\int 5\cdot \ln x\, dx = 5x\cdot \ln x - \int 5x\cdot \frac{1}{x}\, dx = 5x\cdot \ln x - 5x$

2. $\int (3x-1)\cdot e^x\, dx = (3x-1)\cdot e^x - \int 3\cdot e^x\, dx = (3x-1)\cdot e^x - 3e^x = (3x-4)\cdot e^x$

3. $\int x\cdot \sin x\, dx = (-\cos x)\cdot x - \int (-\cos x)\, dx = -x\cdot \cos x + \sin x$

4. $\begin{cases} \int x^2\cdot \sin 2x\, dx = x^2(-\frac{1}{2}\cos 2x) - \int 2x\cdot(-\frac{1}{2}\cos 2x)\, dx = x^2(-\frac{1}{2}\cos 2x) + \int x\cdot \cos 2x\, dx = \\ = -\frac{1}{2}x^2\cos 2x + [x.\frac{1}{2}\sin 2x - \int \frac{1}{2}\sin 2x\, dx] = -\frac{1}{2}x^2\cos 2x + x.\frac{1}{2}\sin 2x + \frac{1}{4}\cos 2x \end{cases}$

5. $\int \arcsin x\, dx = \int 1.\arcsin x\, dx = x.\arcsin x - \int x.\frac{1}{\sqrt{1-x^2}}\, dx = x.\arcsin x + \sqrt{1-x^2}$

6. $\begin{cases} \int (2x^2-4x)\cdot e^x\, dx = (2x^2-4x)\cdot e^x - \int (4x-4)\cdot e^x\, dx = (2x^2-4x)\cdot e^x - [(4x-4)\cdot e^x - \int 4e^x\, dx] = \\ (2x^2-4x)\cdot e^x - [(4x-4)\cdot e^x - 4e^x] = (2x^2-4x-4x+4-4)\cdot e^x = (2x^2-8x+8)\cdot e^x \end{cases}$

7. $\begin{cases} \int \arctan x\, dx = \int 1.\arctan x\, dx = x.\arctan x - \int x.\frac{1}{1+x^2}dx = \\ x.\arctan x - \int \frac{x}{1+x^2}dx = x.\arctan x - \frac{1}{2}\ln(1+x^2) \end{cases}$

8. $\begin{cases} \int (\ln x)^2\, dx = \int 1.(\ln x)^2\, dx = x.(\ln x)^2 - \int x.2\ln x.\frac{1}{x}\, dx = x.(\ln x)^2 - \int 2\ln x\, dx = \\ x.(\ln x)^2 - [2x\ln x - 2x] = x.(\ln x)^2 - 2x\ln x + 2x \end{cases}$

9. $\int x^2\cdot \ln 2x\, dx = \frac{1}{3}x^3.\ln 2x - \int \frac{1}{3}x^3.\frac{1}{x}\, dx = \frac{1}{3}x^3.\ln 2x - \int \frac{1}{3}x^2\, dx = \frac{1}{3}x^3.\ln 2x - \frac{1}{9}x^3$

10. $\begin{cases} \int x^2\cdot \cos x\, dx = x^2\cdot(\sin x) - \int 2x.\sin x\, dx = x^2\cdot(\sin x) - [2x(-\cos x) - \int 2.(-cosx)\, dx = \backslash \\ x^2\cdot(\sin x) + 2x\cos x + \int 2.cosx\, dx = x^2\cdot(\sin x) + 2x\cos x + 2\sin x \end{cases}$

11. $\int (3x-1)\cdot e^{-x}\,dx = (-e^{-x}).(3x-1) - \int 3.(-e^{-x})dx = e^{-x}(-3x-2)$

12. $\int x\cdot\cos(x+2)\,dx = x.(-\sin(x+2)) - \int 1.(-\sin(x+2))dx = -x.\sin(x+2) - \cos(x+2)$

13. $\int \ln(x-2)\,dx = x.\ln(x-2) - \int \frac{x}{x-2}dx = x.\ln(x-2) - \int 1 + \frac{2}{x-2}dx = x.\ln(x-2) - x - 2\ln(x-2)$

14. $\int x\cdot\sin(x+1)\,dx = x.-\cos(x+1) - \int 1.(-\cos(x+1)dx = -x.\cos(x+1) + \sin(x+1)$

15. $\int (2+\ln x)\,dx = x.(2+\ln x) - \int 1\,dx = x + x.\ln x$

16. $\int x\cdot\cos 2x\,dx = x.(\frac{1}{2}\sin 2x) - \int (\frac{1}{2}\sin 2x)dx = \frac{1}{2}x\sin 2x + \frac{1}{4}\cos 2x$

17. $\begin{cases} \int (x^2-2x)\cdot e^x\,dx = (x^2-2x).e^x - \int (2x-2).e^x dx = \\ (x^2-2x).e^x - (2x-2).e^x + \int 2.e^x dx = (x^2+4x+4).e^x \end{cases}$

18. $\int \ln 2x\,dx = x.\ln 2x - \int x.\frac{2}{2x}dx = x.\ln 2x - x$

19. $\int (x+1)\cdot\cos 3x\,dx = (x+1).(\frac{1}{3}\sin 3x) - \int 1.(\frac{1}{3}\sin 3x)dx = (x+1).(\frac{1}{3}\sin 3x) + \frac{1}{9}\cos 3x$

20. $\begin{cases} \int 2x\cdot\ln(x+3)\,dx = x^2.\ln(x+3) - \int \frac{x^2}{x+3}dx = x^2.\ln(x+3) - \int \frac{x^2-9+9}{x+3}dx0 = \\ x^2.\ln(x+3) - \int 1 + \frac{9}{x+3}dx = x^2.\ln(x+3) - (x+9\ln(x+3)) = x^2.\ln(x+3) - x - 9\ln(x+3) \end{cases}$