

# Cvičení 9 - 28.11.2024

červené - spolu

modré - samostatně

učebnice s. 180

## Příklady na tabulku integrálů

1. Vypočtěte integrály

$$(a) \int (4x^3 + 5^x + \sqrt{x} + 1) dx$$

$$(c) \int \left( 5x\sqrt{x} + \frac{1}{2\sqrt{x^3}} - \frac{1}{x} \right) dx$$

$$(e) \int \operatorname{tg}^2 x dx$$

$$(g) \int \frac{(1+x)^2}{\sqrt{x^3}} dx$$

$$(i) \int e^x \left( 2 + \frac{e^{-x}}{x^4} \right) dx$$

$$(k) \int (3^x - 3 \cdot 2^x - 1) dx$$

$$(m) \int (x+1) dx$$

$$(o) \int \left( \frac{7}{\cos^2 x} - 3 \sin x + 5 \right) dx$$

$$(q) \int \frac{1}{\cos 2x - \cos^2 x} dx$$

$$(s) \int \cotg^2 x dx$$

$$(b) \int (3x^2 + \frac{1}{x} - 1) dx$$

$$(d) \int (5\sqrt{x} + 5)(x - \sqrt{x} + 1) dx$$

$$(f) \int \left( 1 - \frac{1}{x} \right)^2 dx$$

$$(h) \int \frac{3 + x e^x}{x} dx$$

$$(j) \int \frac{e^{2x} + 5e^x}{e^x} dx$$

$$(l) \int (7 \cos x + 1) dx$$

$$(n) \int \frac{2^x - 3^x}{6^x} dx$$

$$(p) \int \left( 5 \sin x + \frac{1}{\sin^2 x} - 2 \right) dx$$

$$(r) \int \left( \sin \frac{x}{2} + \cos \frac{x}{2} \right)^2 dx$$

$$(t) \int \frac{2 + 2 \cos^2 x}{1 + \cos 2x} dx$$

## Příklady na per partes

2. Metodou per partes vypočtěte integrály

$$(a) \int 3x e^x dx$$

$$(b) \int x^2 e^x dx$$

$$(c) \int 36 x^5 \ln x dx$$

$$(d) \int x 5^x dx$$

$$(e) \int \sqrt{x} \ln x dx$$

$$(f) \int 4 \ln^2 x dx$$

$$(g) \int \frac{\ln x}{x^2} dx$$

$$(h) \int \frac{3 \ln x}{\sqrt{x}} dx$$

$$(i) \int \ln x dx$$

$$(j) \int (x^2 + 4x - 5) \cos x dx$$

$$(k) \int \sin^2 x dx$$

$$(l) \int x \cdot \sin x dx$$

$$(m) \int (2x + 3) \cos x dx$$

$$(n) \int x^2 \cos x dx$$

$$(o) \int e^x \sin x dx$$

$$(p) \int x^2 \sin x dx$$

## Výsledky

1. (a)  $x^4 + \frac{5x}{\ln 5} + \frac{2}{3} \sqrt{x^3} + x + c$

(b)  $x^3 + \ln |x| - x + c$

(c)  $2\sqrt{x^5} - \frac{1}{\sqrt{x}} - \ln |x| + c$

(d)  $2\sqrt{x^5} + 5x + c$

(e)  $\operatorname{tg} x - x + c$

(f)  $-\frac{1}{x} - 2 \ln |x| + x + c$

(g)  $-\frac{2}{\sqrt{x}} + 4\sqrt{x} + \frac{2}{3} \sqrt{x^3} + c$

(h)  $3 \ln |x| + e^x + c$

(i)  $2e^x - \frac{1}{3x^3} + c$

(j)  $e^x + 5x + c$

(k)  $\frac{1}{\ln 3} 3^x - \frac{3}{\ln 2} 2^x - x + c$

(l)  $7 \sin x + x + c$

(m)  $\frac{1}{2} x^2 + x + c$

(n)  $\frac{1}{\ln 2} \left(\frac{1}{2}\right)^x - \frac{1}{\ln 3} \left(\frac{1}{3}\right)^x + c$

(o)  $7 \operatorname{tg} x + 3 \cos x + 5x + c$

(p)  $-5 \cos x - \cotg x - 2x - c$

(q)  $\cotg x + c$

(r)  $x - \cos x + c$

(s)  $-\cotg x - x + c$

(t)  $\operatorname{tg} x + x + c$

2. (a)  $3x e^x - 3e^x + c$

(b)  $(x^2 - 2x + 2)e^x + c$

(c)  $6x^6 \ln x - x^6 + c$

(d)  $\frac{1}{\ln^2 5} (x \ln 5 - 1) 5^x + c$

$$(e) \quad \frac{2}{3}\sqrt{x^3} \left( \ln x - \frac{2}{3} \right) + c$$

$$(g) \quad -\frac{\ln x + 1}{x} + c$$

$$(i) \quad x \ln x - x + c$$

$$(k) \quad -\frac{1}{2} \sin x \cos x + \frac{1}{2}x + c$$

$$(m) \quad (2x + 3) \sin x + 2 \cos x + c$$

$$(o) \quad \frac{1}{5}e^x (\sin x - \cos x) + c$$

$$(f) \quad 4x \ln^2 x - 8x \ln x + 8x + c$$

$$(h) \quad 6\sqrt{x} (\ln x - 2) + c$$

$$(j) \quad (x^2 + 4x - 7) \sin x + (2x + 4) \cos x + c$$

$$(l) \quad \sin x - x \cos x + c$$

$$(n) \quad x^2 \sin x + 2x \cos x - 2 \sin x + c$$

$$(p) \quad -x^2 \cos x + 2x \sin x + 2 \cos x + c$$