

CÁLCULO DIFERENCIAL E INTEGRAL

Respostas dos exercícios

Thiago de Paula Oliveira

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1 Integral indefinida: parte I

1. Calcular a integral indefinida

$$1) 4x + \frac{3x^2}{2} + \frac{2x^3}{3} + \frac{1}{4}x^4 + c$$

$$2) \frac{3x^{4/3}}{4} + \frac{2x^{3/2}}{3} + c$$

$$3) \sqrt{2}x - ex + \pi x + c$$

$$4) e^x + \frac{1}{2}(-4 + x)x + c$$

$$5) x[-2 + \log(x^2)] + c$$

$$6) -\sin x + c$$

$$7) -\ln[\cos(x)] + c$$

$$8) \frac{1}{4} \left(4x + x^2 + \frac{x^3}{3} \right) + c$$

$$9) \frac{4 + 12x^2 + 3x^7 + 2x^9}{12x^3} + c$$

$$10) -\cos(x) + c$$

$$11) \frac{1}{3} \log(1 - 3x^2 + x^3) + c$$

$$12) \log(2 + x) + c$$

$$13) dx + \frac{cx^2}{2} + \frac{bx^3}{3} + \frac{ax^4}{4} + C$$

$$14) \frac{2}{25} \sqrt{x} (25 + x^2)$$

$$15) \frac{2w^{3/2}}{3} + \frac{w^4}{4}$$

$$16) -8 \log(1 - x) + 8 \log(1 + x)$$

$$17) \frac{25 \left[2 + x \log \left(\frac{1-x}{1+x} \right) \right]}{2x}$$

$$18) e^{-x} + e^x$$

$$2. f(x) = -\frac{1}{x} + 15x - \frac{239}{4}$$

$$3. f(x) = e^x + \log(x) + 3 - e$$

$$4. a) f(x) = 2(1 + x) \quad b) f(x) = \frac{1}{x} + 2x \quad c) f(x) = e^x - 2x - \sin(x)$$

$$5. F(x) = cx + \frac{ax^3}{3} + \frac{\log(x)}{b}.$$

6. Determine uma primitiva genérica para a família de funções

$$f(x) = \frac{1}{a}x^3 + \sqrt{bx} + x^c$$

considerando

$$(a) \frac{x^4}{4a} + \frac{x^{1+c}}{1+c} + \frac{2}{3}x\sqrt{bx}, \text{ tal que } \{x \in \mathbb{R} | a \neq 0, b > 0, c \in \mathbb{N}\}$$

$$(b) \frac{x^4}{4a} + \frac{x^{1+c}}{1+c} + \frac{2}{3}x\sqrt{bx}, \text{ tal que } \{x \in \mathbb{R} | a \neq 0, b > 0, c \in \mathbb{Z}_-\}$$

$$(c) \frac{x^4}{4a} + \frac{x^{1+c}}{1+c} + \frac{2}{3}x\sqrt{bx}, \text{ tal que } \{x \in \mathbb{R} | a \neq 0, b < 0, c \in \mathbb{N}\}$$

7. Calcular a integral indefinida utilizando o método da substituição

$$1) x^2 + \frac{1}{6} (5+x)^6 + c \qquad 2) \frac{8}{27} (-4+x^3)^{9/8} + c \qquad 3) -\frac{5}{9} (6-3t^2)^{3/2} + c$$

$$4) \frac{(1+3x^2)\sqrt{x^2+3x^4}}{9x} + c \qquad 5) -\frac{4+x e^{1/x}}{x} + c \qquad 6) \frac{\text{sen}^6(x)}{6} + c$$

$$7) \frac{2x^2}{\sqrt{x(x+2)}} + \frac{4x}{\sqrt{x(x+2)}} - \frac{4\sqrt{x(x+2)} \log \left[\sqrt{\frac{x}{2}+1} + \sqrt{\frac{x}{2}} \right]}{\sqrt{x(x+2)}} + c$$

$$8) \frac{1}{4} \text{arctg} \frac{x}{4} + c \qquad 9) \frac{|1+x|^3}{3} + c$$

$$10) \frac{ae^{x^2}}{2} + bx + c \qquad 11) \frac{1}{4} (-\log(\cos(2e^x)) + \log(\text{sen}(2e^x)))$$

$$12) \frac{x^4}{4}$$