



Centro Universitário UNA
Cálculo Integral
5ª Lista de Exercícios - Integral Definida
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1. Calcule as seguintes integrais definidas:

(a) $\int_1^4 2x dx$

(b) $\int_0^3 (2x + 1) dx$

(c) $\int_1^4 -3x dx$

(d) $\int_0^2 x^2 dx$

(e) $\int_0^8 (x^2 - 6x) dx$

(f) $\int_0^5 (x^2 - 5x) dx$

(g) $\int_1^4 (x^2 - 3x + 2) dx$

(h) $\int_1^2 \left(\frac{x^3 - x^2 + 2}{x^2} \right) dx$

(i) $\int_0^3 e^x dx$

(j) $\int_0^{2\pi} \sin x dx$

(k) $\int_0^{\pi} \cos x dx$

(l) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (8y^2 + \sin y) dy$

(m) $\int_1^{\sqrt{2}} \left(\frac{u^2}{2} - \frac{1}{u^5} \right) du$

(n) $\int_4^9 2t\sqrt{t} dt$

(o) $\int_{-1}^2 x(1 + x^3) dx$

$$(p) \int_{-3}^{-2} \left(t - \frac{1}{t}\right)^2 dt$$

2. Mostre que $\int_1^4 \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) dx = \frac{20}{3}$

3. Verifique que:

$$(a) \int_{-1}^2 dx = 3$$

$$(b) \int_{-1}^2 x^2 dx = 3$$

$$(c) \int_{-1}^2 x dx = \frac{3}{2}$$

$$(d) \int_0^\pi dx = \pi$$

$$(e) \int_0^\pi \sin x dx = 2$$

$$(f) \int_0^\pi \cos x dx = 0$$

4. Utilizando os cálculos do exercício anterior, calcule:

$$(a) \int_{-1}^2 (2x^2 - 4x + 5) dx$$

$$(b) \int_{-1}^2 (8 - x^2) dx$$

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

$$(d) \int_{-1}^2 (3x^2 - 4x - 1) dx$$

$$(e) \int_{-1}^2 (2x + 1)^2 dx$$

$$(f) \int_{-1}^2 (x - 1)(2x + 3) dx$$

$$(g) \int_{-1}^2 3x(x - 4) dx$$

$$(h) \int_0^\pi (2 \sin x + 3 \cos x + 1) dx$$

5. Suponha que f e g sejam contínuas e que $\int_1^2 f(x) dx = -4$, $\int_1^5 f(x) dx = 6$ e $\int_1^5 g(x) dx = 8$. Determine:

(a) $\int_2^2 g(x)dx$

(b) $\int_5^1 g(x)dx$

(c) $\int_1^2 3f(x)dx$

(d) $\int_2^5 f(x)dx$

(e) $\int_1^5 [f(x) - g(x)]dx$

(f) $\int_1^5 [4f(x) - g(x)]dx$

6. Suponha que $\int_1^2 f(x)dx = 5$. Determine:

(a) $\int_1^2 f(u)du$

(b) $\int_1^2 \sqrt{3}f(z)dz$

(c) $\int_2^1 f(t)dt$

(d) $\int_1^2 [-f(x)]dx$

7. Suponha que f é contínua e que $\int_0^3 f(z)dz = 3$ e $\int_0^4 f(z)dz = 7$. Determine:

(a) $\int_3^4 f(z)dz$

(b) $\int_4^3 f(t)dt$

8. Dado que $\int_4^9 \sqrt{x}dx = \frac{38}{3}$, quanto é $\int_9^4 \sqrt{t}dt$?

9. Se $\int_1^5 f(x)dx = 12$ e $\int_4^5 f(x)dx = 3.6$, encontre $\int_1^4 f(x)dx$.

10. Se $\int_0^9 f(x)dx = 37$ e $\int_0^9 g(x)dx = 16$, encontre $\int_0^9 [2f(x) + 3g(x)]dx$.

11. Ache $\int_0^9 f(x)dx$ se $f(x) = \begin{cases} 3, & x < 3 \\ x, & x \geq 3 \end{cases}$.

12. Sabendo que $\int_1^2 x^2 dx = \frac{7}{3}$, $\int_1^2 x dx = \frac{3}{2}$ e $\int_1^2 dx = 1$, encontre o valor de:

(a) $\int_1^2 (6x - 1) dx$

(b) $\int_1^2 2x(x + 1) dx$

(c) $\int_1^2 (x - 1)(x - 2) dx$

(d) $\int_1^2 (3x + 2)^2 dx$

Respostas

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|--------------|----------------|----------|-----------------------|-------------------------------|---------------------|--------------------|------------------|
| 1) a) 15 | b) 12 | c) -22,5 | d) $\frac{8}{3}$ | e) $\frac{44}{3}$ | f) $-\frac{125}{6}$ | g) 4,5 | h) $\frac{3}{2}$ |
| i) $e^3 - 1$ | j) 0 | k) 0 | l) $\frac{2}{3}\pi^3$ | m) $\frac{16\sqrt{2}-17}{48}$ | n) $\frac{844}{5}$ | o) $\frac{81}{10}$ | p) $\frac{9}{2}$ |
| 4) a) 15 | b) 21 | c) 0 | d) 0 | e) -21 | f) $-\frac{3}{2}$ | g) -9 | |
| h) $4 + \pi$ | 5) a) 0 | b) -8 | c) -12 | d) 10 | e) -2 | f) 16 | |
| 6) a) 5 | b) $5\sqrt{3}$ | c) -5 | d) -5 | 7) a) 4 | b) -4 | 8) $-\frac{38}{3}$ | |
| 9) 8.4 | 10) 122 | 11) 17 | 12) a) 8 | b) $\frac{23}{3}$ | c) $-\frac{1}{6}$ | d) 43 | |