

MAT 121 - IOUSP - Cálculo II
2ª Lista de Exercícios - 2º semestre de 2014
Prof. Oswaldo Rio Branco de Oliveira

1. Calcule:

a) $\int_0^1 (3x + 1)^4 dx$

b) $\int_{-3}^4 \sqrt[3]{5-x} dx$

c) $\int_1^2 \frac{2}{(3x-2)^3} dx$

d) $\int_0^1 xe^{x^2} dx$

e) $\int_{-1}^0 x\sqrt{x+1} dx$

f) $\int_0^{\pi/3} \cos 2x dx$

2. Calcule $\int_{-\pi}^{\pi} \frac{\operatorname{sen} x}{x^4 + x^2 + 1} dx$.

3. Calcule:

a) $\int_0^1 x\sqrt{x^2+3} dx$

b) $\int_1^2 x(x^2-1)^5 dx$

c) $\int_{-1}^0 x^2 e^{x^3} dx$

d) $\int_1^2 \frac{3s}{1+s^2} ds$

e) $\int_0^1 \frac{1}{1+4s} ds$

f) $\int_0^3 \frac{x}{\sqrt{x+1}} dx$

4. Calcule:

a) $\int_{-1}^1 \sqrt[5]{x^2} dx$

b) $\int_2^4 \frac{1}{x^3} dx$

c) $\int_{-2}^{-1} \frac{x+x^2}{x^2} dx$

d) $\int_2^3 \left(x^2 + \frac{3}{x}\right) dx$

e) $\int_0^{\ln 2} (e^{2x} + e^{-x}) dx$

f) $\int_1^4 \left(e^{4x} + \frac{1}{x^2}\right) dx$

5. a) Verifique: $\operatorname{sen}^2 x = \frac{1 - \cos 2x}{2}$ e $\cos^2 x = \frac{1 + \cos 2x}{2}$;

b) Calcule $\int_{-\frac{\pi}{2}}^{+\frac{\pi}{2}} \operatorname{sen}^2 x dx$.

6. Calcule:

a) $\int_0^{\frac{\pi}{2}} \cos^2 2x \, dx$

b) $\int_0^{\frac{\pi}{10}} \cos^2 5x \, dx$

c) $\int_{-\pi}^{\pi} \sin^2 3x \, dx$

d) $\int_{-2\pi}^{2\pi} \cos^2 \left(\frac{x}{2}\right) \, dx$

7. Calcule:

a) $\int (x + \sec^2 3x) \, dx$

b) $\int (1 + \sec x)^2 \, dx$

8. Calcule:

a) $\int_1^2 \sqrt{3x-2} \, dx$

b) $\int_1^3 \frac{dx}{3x-2}$

c) $\int_1^3 \frac{1}{(3x-2)^2} \, dx$

d) $\int_{\pi}^{2\pi} x \operatorname{sen} x^2 \, dx$

e) $\int \frac{3x}{5+6x^2} \, dx$

f) $\int \frac{x}{(1+4x^2)^2} \, dx$

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

h) $\int e^x \sqrt{1+e^x} \, dx$

9. Calcule:

a) $\int_1^2 \frac{x}{1+3x^2} \, dx$

b) $\int_0^1 \frac{x}{\sqrt{1+x^2}} \, dx$

c) $\int_0^1 \frac{x^3}{\sqrt{1+x^2}} \, dx$

d) $\int_{-\frac{3}{2}}^{-1} (2x+3)^{100} \, dx$

e) $\int_2^3 \frac{1}{(x-1)^3} \, dx$

f) $\int_0^1 \frac{x}{1+x^4} \, dx$

10. Calcule:

a) $\int \frac{2x+3}{x+1} \, dx$

b) $\int \frac{x^2}{x+1} \, dx$

Vide, no verso, o método das frações parciais.

FRAÇÕES PARCIAIS

11. Suponha α , β , m e n constantes, $\alpha \neq \beta$. Mostre que existem constantes A e B tais que $\frac{mx+n}{(x-\alpha)(x-\beta)} = \frac{A}{x-\alpha} + \frac{B}{x-\beta}$.

12. Calcule:

a) $\int \frac{1}{(x+1)(x-1)} dx$

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

c) $\int \frac{x}{x^2-4} dx$

d) $\int \frac{1}{x^2-4} dx$

e) $\int \frac{5x+3}{x^2-3x+2} dx$

f) $\int \frac{x+1}{x^2-x-2} dx$

g) $\int \frac{2}{x^2-5x+6} dx$

h) $\int \frac{x-3}{x^2+3x+2} dx$

13. Calcule:

a) $\int \frac{1}{2+5x^2} dx$

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

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

d) $\int \frac{1}{x^2+2x+2} dx$

e) $\int \frac{1}{x^2+4x+8} dx$

f) $\int \frac{1}{x^2+x+1} dx$

14. Sejam $\alpha \neq 0$ e β constantes. Verifique:

a) $\int \frac{1}{x^2-\alpha^2} dx = \frac{1}{2\alpha} \ln \left| \frac{x-\alpha}{x+\alpha} \right| + k$

b) $\int \frac{1}{\alpha^2+(x+\beta)^2} dx = \frac{1}{\alpha} \operatorname{arctg} \left(\frac{x+\beta}{\alpha} \right) + k.$

15. Calcule:

a) $\int \frac{x^3}{(16+x^4)^3} dx$

b) $\int \frac{x^3}{16+x^4} dx$

c) $\int \frac{x}{16+x^4} dx$

d) $\int \frac{x^3}{1+x^8} dx$