MAT 144 - IOUSP - Cálculo I - Período Diurno
9ª Lista de Exercícios - 1º semestre de 2010
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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) $\int_0^{\pi/3} \cos 2x\,dx$

g) $\int_0^1 \frac{x^2}{1+x^3}\,dx$ h) $\int_0^1 \frac{x^2}{(1+x^3)^2}\,dx$

i) $\int_{-1}^0 x^2\sqrt{1+x^3}\,dx$ j) $\int_0^1 \frac{x}{(x+1)^5}\,dx$

k) $\int_{-1}^0 x(x+1)^{100}\,dx$ l) $\int_1^2 x^2(x-2)^{10}\,dx$

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) $\int_{-1}^0 x^2e^{x^3}\,dx$ d) $\int_1^2 \frac{3s}{1+s^2}\,ds$

e) $\int_0^1 \frac{1}{1+4s}\,ds$ f) $\int_0^3 \frac{x}{\sqrt{x+1}}\,dx$

g) $\int_0^1 \frac{s}{\sqrt{s^2+1}}\,ds$ h) $\int_0^3 \frac{x^2}{\sqrt{x+1}}\,dx$

i) $\int_0^1 \frac{x^2}{(x+1)^2}\,dx$ j) $\int_{-1}^{+1} x^3(x^2+3)^{10}\,dx$

k) $\int_0^{\sqrt{3}} x^3\sqrt{x^2+1}\,dx$ l) $\int_0^{\pi/3} \operatorname{sen} x\cos^2 x\,dx$

m) $\int_0^{\pi/6} \cos x\operatorname{sen}^5 x\,dx$ n) $\int_{\pi/3}^{\pi/2} \operatorname{sen}^3 x\,dx$

4. Calcule:

a) $\int \sqrt[5]{x^2}\ dx$ b) $\int \frac{1}{x^3}\ dx$

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

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

g) $\int \frac{x^5+x+1}{x^2}\ dx$ h) $\int e^{\sqrt{2x}}\ dx$

5. Calcule:

a) $\int_0^1 e^{2x}dx$ b) $\int_{-1}^{+1} e^{-x}dx$

c) $\int_0^{1/2} \frac{1}{\sqrt{1-x^2}}\ dx$ d) $\int_1^2 \frac{x^3+1}{x}\ dx$

6. Calcule:

a) $\int_0^{\pi/3} (\text{sen}3x+\cos 3x)\ dx$ b) $\int_{-\pi/2}^{\pi/2} \cos\left(\frac{x}{2}\right)\ dx$

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

b) Calcule $\int \text{sen}^2x\ dx$.

8. Calcule:

a) $\int \cos^2 2x\ dx$ b) $\int \cos^2 5x\ dx$

c) $\int \text{sen}^2 3x\ dx$ d) $\int \cos^2\left(\frac{x}{2}\right)\ dx$

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

g) $\int (\text{sen}x-\cos x)^2\ dx$ h) $\int (5+\text{sen}3x)^2\ dx$

9. Calcule:

   a) $\int (x + \sec^2 3x)\ dx$ b) $\int (1 + \sec x)^2\ dx$

10. a) Determine $\alpha,\ \beta$ tais que $\text{sen}6x\ \cos x = \frac{1}{2}(\text{sen}\alpha x + \text{sen}\beta x)$;

    b) Calcule $\int \text{sen}6x\ \cos x\ dx$;

    c) Calcule $\int \text{sen}(mx)\ \cos(nx)\ dx;\ m,\ n \in I\!N$.

11. a) Determine $\alpha,\ \beta$ tais que $\text{sen}3x\ \text{sen}2x = \frac{-1}{2}(\cos\alpha x - \cos\beta x)$;

    b) Calcule $\int \text{sen}3x\ \text{sen}2x\ dx$;

    c) Calcule $\int \text{sen}(mx)\ \text{sen}(nx)\ dx;\ m,\ n \in I\!N$.

12. a) Calcule $\int \cos 5x\ \cos 2x\ dx$;

    b) Calcule $\int \cos(mx)\ \cos(nx)\ dx;\ m,\ n \in I\!N$.

13. Calcule:

    a) $\int \sqrt{3x-2}\ dx$ b) $\int \frac{dx}{3x-2}$

    c) $\int \frac{1}{(3x-2)^2}\ dx$ d) $\int x\ \text{sen}x^2\ dx$

    e) $\int xe^{x^2}\ dx$ f) $\int x^2 e^{x^3}\ dx$

    g) $\int x^3\ \cos x^4\ dx$ h) $\int \cos^3 x\ \text{sen}x\ dx$

    i) $\int \frac{3x}{5+6x^2}\ dx$ j) $\int \frac{x}{(1+4x^2)^2}\ dx$

    k) $\int x\sqrt{1+3x^2}\ dx$ l) $\int e^x\sqrt{1+e^x}\ dx$

14. Calcule:

a) $\int_0^1 xe^{-x^2}\,dx$

b) $\int_0^{\pi/3} \text{sen}^4 x\,\cos x\,dx$

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

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

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

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

g) $\int_0^{\sqrt{\pi}} x\,\text{sen}(3x^2)\,dx$

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

i) $\int_0^{\pi/3} \frac{\text{sen}x}{\cos^2 x}\,dx$

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

15. Calcule:

a) $\int \text{sen}^2 x\,\cos x\,dx$

b) $\int \text{sen}^2 x\,\cos^3\,dx$

c) $\int \cos^3 x\,\text{sen}^3 x\,dx$

d) $\int \text{sen}x\,\sqrt{\cos x}\,dx$

e) $\int \text{sen}2x\sqrt{1+\cos^2 x}\,dx$

f) $\int \text{sen}2x\sqrt{5+\text{sen}^2 x}\,dx$

g) $\int \text{sen}^3 x\,dx$

h) $\int \cos^5 x\,dx$

i) $\int \text{tg}^3 x\ \sec^2 x\,dx$

j) $\int \text{tg}x\ \sec^2 x\,dx$

k) $\int \text{tg}x\ \sec^3 x\,dx$

l) $\int \text{tg}^3 x\ \sec^4 x\,dx$

m) $\int \text{sen}x\,\sqrt{3+\cos x}\,dx$

n) $\int \text{sen}x\ \sec^2 x\,dx$

o) $\int \text{sen}x\ \sec^3 x\,dx$

p) $\int \text{sen}^2 x\,\cos^2 x\,dx$

q) $\int \text{tg}^3 x\,\cos x\,dx$

r) $\int \frac{\sec^2 x}{3+2\text{tg}x}\,dx$

16. Calcule:

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

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

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

18. Calcule:

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

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

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

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

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

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

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

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

19. Calcule:

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

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

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

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

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

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

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

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

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

21. Calcule:

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

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

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

d) $\displaystyle\int \text{tg}2x\,dx$

e) $\displaystyle\int \frac{1}{x\ \ln x}\,dx$

f) $\displaystyle\int \frac{1}{x(\ln x)^2}\,dx$ ll

g) $\displaystyle\int \text{tg}^2 x\,dx$

h) $\displaystyle\int \frac{1}{\sqrt{1-x^2}}\,dx$

i) $\displaystyle\int \frac{x}{\sqrt{1-4x^2}}\,dx$

j) $\displaystyle\int \frac{2x+3}{\sqrt{1-4x^2}}\,dx$

k) $\displaystyle\int \frac{2}{4-9x^2}\,dx$

l) $\displaystyle\int \frac{x}{\sqrt{1-x^4}}\,dx$

m) $\displaystyle\int \frac{e^x}{\sqrt{1-e^{2x}}}\,dx$

n) $\displaystyle\int \frac{e^x}{\sqrt{1-e^x}}\,dx$

o) $\displaystyle\int \frac{1}{x\sqrt{1-(\ln x)^2}}\,dx$

p) $\displaystyle\int \frac{2}{\sqrt{1-(x+1)^2}}\,dx$

q) $\displaystyle\int \frac{e^x}{1+e^{2x}}\,dx$

r) $\displaystyle\int \frac{e^x}{\sqrt{1+3e^x}}\,dx$

s) $\displaystyle\int \frac{1}{x}\cos(\ln x)\,dx$

n) $\displaystyle\int \frac{x^3}{1+x^8}\,dx$

22. Esboce os gráficos de:

a) $f(x) = \dfrac{x^2}{x^2-x-2}$

b) $f(x) = \dfrac{x^2-x-1}{x^2}$