CEFET-RJ
Nova Iguaçu

Centro Federal de Educação Tecnológica
Unidade de Nova Iguaçu
Ensino de Graduação
Matemática

Exercícios de Cálculo 2
Integrais Definidas e Indefinidas
Lista 1

1) Para cada função f abaixo, encontre uma função g de forma que $g'(x) = f(x)$.

- a) $f(x) = 2x^2 + 5$;
- b) $f(x) = x^5 + \frac{1}{3}x^3 + x^2 + 2$;
- c) $f(x) = e^{2x} + \frac{1}{x} + cos(2x) + 1$;
- d) $f(x) = sen(x) + xe^{x^2} - \frac{1}{x^2}$;
- e) $f(x) = ln(e^{\frac{1}{x}}) + arccos(cos(x^{-4}sen(\frac{1}{x^3})))$;
- f) $f(x) = 3((\frac{2}{3}x^3+2)^8+1)^2 16x^2(\frac{2}{3}x^3+2)^7$;
- g) $f(x) = 2x\frac{1}{3}(\sqrt[3]{x^2+1})^{-2}sec^2(\sqrt[3]{x^2+1})$;

2) Resolva as integrais indefinidas abaixo:

a) $\displaystyle\int x^2(2x^3-1)^7 dx$;

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

c) $\displaystyle\int sen^2(x)cos(x)dx$;

d) $\displaystyle\int \frac{1}{(3x+7)^7} dx$;

e) $\displaystyle\int \frac{sec^2(\sqrt{x})}{\sqrt{x}} dx$;

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

g) $\displaystyle\int \frac{x^2+1}{\sqrt[3]{x+3}} dx$ faça $u = \sqrt[3]{x+3}$;

h) $\displaystyle\int \frac{ln(x)}{x} dx$;

i) $\displaystyle\int tan(\alpha x)dx \quad \alpha \in \mathbb{R}$;

j) $\displaystyle\int \frac{x}{\sqrt{x+1}} dx$ faça $u = \sqrt{x+1}$;

k) $\displaystyle\int \frac{1}{\sqrt{1+\sqrt[3]{x}}} dx$ faça $u = 1 + \sqrt[3]{x}$;

l) $\displaystyle\int \frac{1}{y\sqrt{y^3-1}} dy$;

m) $\displaystyle\int 2\sqrt{2-3x}dx$;

n) $\displaystyle\int 3tcos(3t^2)dt$;

o) $\displaystyle\int \frac{sec^2(\sqrt{x})}{\sqrt{x}} dx$;

p) $\displaystyle\int sen\left(\frac{3x}{2}\right) dx$;

q) $\displaystyle\int \sqrt{ax+b}dx$ para $a \in \mathbb{R}^*$;

r) $\displaystyle\int sen(x)cos(x)dx$;

s) $\displaystyle\int \frac{x}{1+x^4} dx$ faça $u = x^2$;

t) $\displaystyle\int \frac{e^t}{1+e^{2t}} dt$;

u) $\displaystyle\int \frac{1+sen(x)}{x-cos(x)} dx$;

v) $\displaystyle\int \frac{sen(\theta)}{\sqrt{1-cos\theta}} d\theta$;

w) $\displaystyle\int \frac{e^t+2}{e^t+2t} dt$;

x) $\displaystyle\int \frac{1}{xln(x)} dx$;

y) $\displaystyle\int \frac{3}{(1+\sqrt{x})\sqrt{x}} dx$;

z) $\displaystyle\int \frac{2+3x}{\sqrt{1+4x+3x^2}} dx$;

3) Encontre as primitivas:

a) $\int xe^{3x}dx;$

b) $\int xcos(2x)dx;$

c) $\int ln(x)dx;$

d) $\int (ln(x))^2dx;$

e) $\int \frac{xe^x}{(x+1)^2}dx;$

f) $\int x^2sen(3x)dx;$

g) $\int sen(x)ln(cos(x))dx;$

h) $\int e^xcos(x)dx;$

i) $\int \frac{e^{2x}}{\sqrt{1-e^x}}dx;$

j) $\int x^5e^{x^2}dx;$

4) Reescreva as expressões abaixo efetuando as operações:

a) $\frac{1}{x-3}+\frac{2x}{2x+1}=;$

b) $\frac{1}{(x-1)^2}+\frac{x}{2x+1}-\frac{x^2}{x-1}=;$

c) $\frac{x-1}{(1+x^2)^2}+\frac{1}{(1+x^2)(x+1)^2}=;$

d) $\frac{1}{(x+2)^2}+\frac{1}{(x+2)^3}+\frac{1}{(x+2)^4}=;$

e) $\frac{1}{x^2+x-3}+\frac{x}{x^2+2x+1}=;$

4) Agora efetue o processo inverso ao do exercício anterior, isto é, separe em frações parciais.

a) $f(x)=\frac{x^3-2x+3}{(x-3)(x-1)};$

b) $f(x)=\frac{x+1}{(x-1)(x+2)(x-3)};$

c) $f(x)=\frac{x^4+2x^2+3x}{x^3-6x^2+11x-6};$

d) $f(x)=\frac{1}{(x-1)^2(x+2)^2};$

e) $f(x)=\frac{2x+3}{(x^2+1)(x+1)^2};$

e) $f(x)=\frac{2x^2+x+1}{(x^2-x+1)(x^2+1)(x+1)^2};$

5) Calcule as integrais indefinidas:

a) $\int \frac{x^2+1}{2x^3-3x^2-8x-3}dx;$

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

c) $\int \frac{x^3+3x-1}{x^4-4x^2}dx;$

d) $\int \frac{2x^3}{x^2+x}dx;$

e) $\int \frac{x-1}{x^3+x^2-4x-4}dx;$

f) $\int \frac{x^2+1}{2x^3-x^2-3x+2}dx;$

g) $\int \frac{x-1}{x^4+4x^3+6x^2+4x+1}dx;$

h) $\int \frac{x-2}{(x+2)^2(x^2+x-1)}dx;$

i) $\int \frac{x^2+2x-1}{(x^2+x+1)^2}dx;$

6) Encontre uma anti-derivada para:

a) $\displaystyle\int \frac{\sqrt{9-x^2}}{x^2}dx;$

b) $\displaystyle\int \sqrt{x^2+5}dx;$

c) $\displaystyle\int \frac{1}{x^3\sqrt{x^2-9}}dx;$

d) $\displaystyle\int \frac{1}{\sqrt{x^2-25}}dx;$

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

f) $\displaystyle\int \frac{1}{(4+x^2)^{\frac{3}{2}}}dx;$

g) $\displaystyle\int \frac{\sqrt{4-x^2}}{x^2}dx;$

h) $\displaystyle\int \frac{x^3}{(25-x^2)^2}dx;$

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