

## 1 Integral por partes

**Exercícios** Calcule as seguintes integrais indefinidas.

a)  $\int x^2 \ln x dx$

h)  $\int (\ln x)^2 dx$

b)  $\int x \cos x dx$

i)  $\int e^{2x} \operatorname{sen} 3x dx$

c)  $\int x \cos 5x dx$

j)  $\int x e^{-x} dx$

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

k)  $\int x^2 \operatorname{sen}(ax) dx$

e)  $\int x^2 \cos 3x dx$

l)  $\int x^5 \ln x dx$

f)  $\int \ln(2x+1) dx$

m)  $\int \operatorname{sen}(\ln x) dx$

g)  $\int x \sec^2 2x dx$

n)  $\int (2x+3)e^x dx$

**Respostas:**

a)  $\frac{1}{3}x^3 \ln x - \frac{1}{9}x^3 + c$

h)  $x(\ln x)^2 - 2x \ln x + 2x + c$

b)  $x \operatorname{sen} x + \cos x + c$

i)  $\frac{1}{13}e^{2x}(2 \operatorname{sen} 3x - 3 \cos 3x) + c$

c)  $\frac{1}{5}x \operatorname{sen} 5x + \frac{1}{25} \cos 5x + c$

j)  $-x e^{-x} - e^{-x} + c$

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

k)  $-\frac{x^2}{a} \cos ax + \frac{2}{a^3}(ax \operatorname{sen} ax + \cos ax) + c$

e)  $\frac{1}{3}x^2 \operatorname{sen} 3x + \frac{2}{9}x \cos 3x - \frac{2}{27} \operatorname{sen} 3x + c$

l)  $\frac{x^6}{6} \ln x - \frac{x^6}{36} + c$

f)  $\frac{1}{2}(2x+1) \ln(2x+1) - x + c$

m)  $\frac{1}{2}x \operatorname{sen}(\ln x) - \frac{1}{2}x \cos(\ln x) + c$

g)  $\frac{1}{2}x \operatorname{tg} 2x - \frac{1}{4} \ln |\sec 2x| + c$

n)  $2x e^x + e^x + c$

## 2 Integral Definida

**TEOREMA FUNDAMENTAL DO CÁLCULO, PARTE 2** Se  $f$  for contínua em  $[a, b]$ , então

$$\int_a^b f(x) dx = F(b) - F(a)$$

onde  $F$  é qualquer primitiva de  $f$ , isto é, uma função tal que  $F' = f$ .

## Exercícios

**19–42** Calcule a integral.

19.  $\int_{-1}^2 (x^3 - 2x) dx$

21.  $\int_1^4 (5 - 2t - 3t^2) dt$

23.  $\int_0^4 \sqrt{x} dx$

25.  $\int_1^2 \frac{3}{t^4} dt$

27.  $\int_0^2 x(2 + x^5) dx$

29.  $\int_1^9 \frac{x-1}{\sqrt{x}} dx$

31.  $\int_0^{\pi/4} \sec^2 t dt$

33.  $\int_1^2 (1 + 2y)^2 dy$

35.  $\int_1^9 \frac{1}{2x} dx$

37.  $\int_{1/2}^{\sqrt{3}/2} \frac{6}{\sqrt{1-t^2}} dt$

39.  $\int_{-1}^1 e^{u+1} du$

## Respostas:

19.  $\frac{3}{4}$

21. 63

23.  $\frac{16}{3}$

25.  $\frac{7}{8}$

27.  $\frac{156}{7}$

29.  $\frac{40}{3}$

31. 1

33.  $\frac{49}{3}$

35.  $\ln 3$

37.  $\pi$

39.  $e^2 - 1$