	INSTITUTO FEDERAL SUL-RIO-GRANDENSE **Campus Passo Fundo**
	Curso: Engenharia Mecânica
	Disciplina: Cálculo Integral
	Professor: Gustavo de Oliveira Rosa
	Discente:
	Lista 1: Integrais indefinidas

1. Calcule a integral fazendo a substituição dada.

   (a) $\int \cos 3x \, dx, \quad u = 3x$

   (b) $\int x(4 + x^2)^{10} \, dx, \quad u = 4 + x^2$

   (c) $\int x^2 \sqrt{x^3 + 1} \, dx, \quad u = x^3 + 1$

   (d) $\int \dfrac{dt}{(1 - 6t)^4}, \quad u = 1 - 6t$

   (e) $\int \cos^3 \theta \sin \theta \, d\theta, \quad u = \cos \theta$

   (f) $\int \dfrac{\sec^2(1/x)}{x^2} \, dx, \quad u = 1/x$

2. Calcule cada integral indefinida.

   (a) $\int x \sin x^2 \, dx$

   (b) $\int (3x - 2)^{20} \, dx$

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

   (d) $\int \dfrac{dx}{5 - 3x}$

   (e) $\int \sin \pi t \, dt$

   (f) $\int \dfrac{e^x}{(1 - e^x)^2} \, dx$

   (g) $\int \dfrac{a + bx^2}{\sqrt{3ax + bx^3}} \, dx$

   (h) $\int x^2 e^{x^3} \, dx$

   (i) $\int (5t + 2)^{24} \, dt$

   (j) $\int \sec^2 2\theta \, d\theta$

   (k) $\int u\sqrt{1 - u^2} \, du$

   (l) $\int e^x \cos(e^x) \, dx$

   (m) $\int \dfrac{\sin \sqrt{x}}{\sqrt{x}} \, dx$

   (n) $\int \dfrac{z^3}{z^4 + 1} \, dz$

   (o) $\int \cos^4 \theta \sin \theta \, d\theta$

   (p) $\int \dfrac{(\ln x)^2}{x} \, dx$

   (q) $\int \sec^2 \theta \tan^3 \theta \, d\theta$

   (r) $\int \sqrt{x} \sin(1 + x^{3/2}) \, dx$

3. Ache a solução de cada equação diferencial, determinada pelas condições iniciais.

   (a) $\dfrac{dy}{dx} = x^2 - 2x - 4; \, y(3) = -6$

   (b) $f'(x) = (x + 1)(x + 2); \, y(-3) = -\dfrac{3}{2}$

   (c) $\dfrac{ds}{dt} = \cos \dfrac{t}{2}; \, s(\pi/3) = 3$

   (d) $\dfrac{d^2u}{dv^2} = 4(1 + 3v)^2; \, u(-1) = -1$ e $\dfrac{du}{dv}(-1) = -2;$

   (e) $f''(x) = -\dfrac{3}{x^4}; \, f(1) = \dfrac{1}{2}$ e $f'(1) = -1$

Gabarito

Questão 1: .

(a) $\frac{1}{3}\sin 3x + C$

(b) $\frac{1}{22}(4 + x^2)^{11} + C$

(c) $\frac{2}{9}(x^3 + 1)^{3/2} + C$

(d) $\frac{1}{18}(1 - 6t)^{-3} + C$

(e) $-\frac{1}{4}\cos^4 \theta + C$

(f) $-\tan\left(\frac{1}{x}\right) + C$

Questão 2: .

(a) $-\frac{1}{2}\cos x^2 + C$

(b) $\frac{(3x - 2)^{21}}{63} + C$

(c) $\frac{1}{3}(2x + x^2)^{3/2} + C$

(d) $-\frac{1}{3}\ln|5 - 3x| + C$

(e) $-\frac{1}{\pi}\cos \pi t + C$

(f) $\frac{1}{1 - e^x} + C$

(g) $\frac{2}{3}\sqrt{3ax + bx^3} + C$

(h) $\frac{1}{3}e^{x^3} + C$

(i) $\frac{(5t + 2)^{25}}{125} + C$

(j) $\frac{1}{2}\tan 2\theta + C$

(k) $-\frac{1}{2}(1 - u^2)^{3/2} + C$

(l) $\sin e^x + C$

(m) $-2\cos \sqrt{x} + C$

(n) $\frac{1}{4}\ln|z^4 + 1| + C$

(o) $-\frac{1}{5}\sin^5 \theta + C$

(p) $\frac{(\ln x)^3}{3} + C$

(q) $\frac{1}{4}\tan^4 \theta + C$

(r) $-\frac{2}{3}\cos(1 + x^{3/2}) + C$

Questão 3: .

1. $y = \frac{1}{3}x^3 - x^2 - 4x + 6$

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

3. $s(t) = 2\sin \frac{t}{2} + 2$

4. $u = 3v^4 + 4v^3 + 2v^2 + 2v$

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