

## EXERCÍCIOS COMPLEMENTARES DE CÁLCULO I

21. **Error Analysis** Given  $4x^2 + 7x - 5y^2 = -7$ , describe and correct the error in finding  $dy/dx$ .

$$\frac{d}{dx}[4x^2 + 7x - 5y^2] = \frac{d}{dx}[-7]$$

$$8x + 7 - 5y^2 \frac{dy}{dx} = 0$$

$$-5y^2 \frac{dy}{dx} = -8x - 7$$

$$\frac{dy}{dx} = \frac{8x + 7}{5y^2} \quad \times$$

22. **Error Analysis** Given  $e^y + xy = 4$ , describe and correct the error in finding  $dy/dx$ .

$$\frac{d}{dx}[e^y + xy] = \frac{d}{dx}[4]$$

$$e^y + x \frac{dy}{dx} + y = 0$$

$$x \frac{dy}{dx} = -e^y - y$$

$$\frac{dy}{dx} = \frac{-e^y - y}{x} \quad \times$$



**Finding a Derivative** In Exercises 1–20, find  $dy/dx$  by implicit differentiation.

1.  $x^2 + y^2 = 9$
2.  $x^2 - y^2 = 25$
3.  $x^{1/2} + y^{1/2} = 16$
4.  $x^{1/3} + y^{1/3} = 8$
5.  $x^3 - xy + y^2 = 7$
6.  $x^2y + y^2x = -2$
7.  $\sqrt{3xy} = x + y$
8.  $\sqrt{xy} = x^2y + 1$
9.  $xe^y - 10x + 3y = 0$
10.  $e^{xy} + x^2 - y^2 = 10$
11.  $\sin x + 2 \cos 2y = 1$
12.  $(\sin \pi x + \cos \pi y)^2 = 2$
13.  $\csc x = x(1 + \tan y)$
14.  $\cot y = x - y$
15.  $y = \sin xy$
16.  $x = \sec \frac{1}{y}$
17.  $x^2 - 3 \ln y + y^2 = 10$
18.  $\ln xy + 5x = 30$
19.  $4x^3 + \ln y^2 + 2y = 2x$
20.  $4xy + \ln x^2y = 7$

**Error Analysis** In Exercises 99–102, describe and correct the error when finding the derivative of the function.

99. If  $y = (1 - x)^{1/2}$ , then  $y' = \frac{1}{2}(1 - x)^{-1/2}$ . **X**

100. If  $f(x) = \sin^2 2x$ , then  $f'(x) = 2(\sin 2x)(\cos 2x)$ . **X**

101.  $\frac{d}{dx} \left[ \frac{e^{3x}}{x} \right] = \frac{3xe^{2x} - e^{3x}}{x^2} = e^{2x} \left( \frac{3x - e^x}{x^2} \right)$  **X**

102.  $\frac{d}{dx} [x^4 e^{-2x}] = x^4 e^{-2x} + e^{-2x} (4x^3) = x^3 e^{-2x} (x + 4)$  **X**



**Finding a Derivative of a Transcendental Function** In Exercises 53–68, find the derivative of the transcendental function.

53.  $f(t) = t^2 \sin t$

54.  $f(\theta) = (\theta + 1)\cos \theta$

55.  $f(t) = \frac{\cos t}{t}$

56.  $f(x) = \frac{\sin x}{x^3}$

57.  $f(x) = -e^x + \tan x$

58.  $y = e^x - \cot x$

59.  $y = \frac{3(1 - \sin x)}{2 \cos x}$

60.  $y = \frac{\sec x}{x}$

61.  $y = -\csc x - \sin x$

62.  $y = x \sin x + \cos x$

63.  $f(x) = x^2 \tan x$

64.  $f(x) = \sin x \cos x$

65.  $y = 2x \sin x + x^2 e^x$

66.  $h(x) = 2e^x \cos x$

67.  $y = \frac{e^x}{4\sqrt{x}}$

68.  $y = \frac{2e^x}{x^2 + 1}$