Eric Nguyen
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Pg. 545 #1-23 odd

1. For $f(x, y) = x^2 - 3xy$, find $f(0, -2)$, $f(2, 3)$, and $f(10, -5)$.

$$f(0, -2) = (0)^2 - 3(0)(-2) = 0 \tag{1}$$
$$f(2, 3) = (2)^2 - 3(2)(3) = -14 \tag{2}$$
$$f(10, -5) = (10)^2 - 3(10)(-5) = 250 \tag{3}$$

3. For $f(x, y) = 3^x + 7xy$, find $f(0, -2)$, $f(-2, 1)$, and $f(2, 1)$.

$$f(0, -2) = 3^{(0)} + 7(0)(-2) = 1 \tag{4}$$
$$f(-2, 1) = 3^{(-2)} + 7(-2)(1) = -13\frac{8}{9} \tag{5}$$
$$f(2, 1) = 3^{(2)} + 7(2)(1) = 23 \tag{6}$$

5. For $f(x, y) = \ln x + y^3$, find $f(e, 2)$, $f(e^2, 4)$, and $f(e^3, 5)$.

$$f(e, 2) = \ln(e) + (2)^3 = 9 \tag{7}$$
$$f(e^2, 4) = 2\ln\left(e^2\right) + (4)^3 = 66 \tag{8}$$
$$f(e^3, 5) = 3\ln\left(e^3\right) + (5)^3 = 128 \tag{9}$$

7. For $f(x, y, z) = x^2 - y^2 + z^2$, find $f(-1, 2, 3)$ and $f(2, -1, 3)$.

$$f(-1, 2, 3) = (-1)^2 - (2)^2 + (3)^2 = 6 \tag{10}$$
$$f(2, -1, 3) = (2)^2 - (-1)^2 + (3)^2 = 12 \tag{11}$$

9. $R(P, E) = \frac{P}{E}$

$$R(32.03, 1.25) = \frac{32.03}{1.25} \approx 25.62 \tag{12}$$

11. $C_2 = \left(\frac{V_2}{V_1}\right)^{0.6} C_1$

$$C_2 = \left(\frac{160,000}{80,000}\right)^{0.6} (100,000) \approx \$151,571.66 \tag{13}$$

13. $S(a, d, V) = \frac{aV}{0.51d^2}$

$$S\left(0.78, 100, 1.6 \times 10^6\right) = \frac{(0.78)\left(1.6 \times 10^6\right)}{0.51(100)^2} \approx 244.7\,\text{mph} \tag{14}$$

15. $S(h, w) = 0.024265h^{0.3964}w^{0.5378}$

$$S(150, 80) = 0.024265(150)^{0.3964}(80)^{0.5378} \approx 1.87\,\text{m}^2 \tag{15}$$

17. For the tornado described in Exercise 13, if the wind speed measures 200 mph, how far from the center was the measurement taken?

$$200 = \frac{(0.78)(1.6 \times 10^6)}{0.51d^2} \tag{16}$$

$$d = \sqrt{\frac{(0.78)(1.6 \times 10^6)}{0.51 \cdot 200}} \tag{17}$$

$$\approx 110.6\,\text{ft} \tag{18}$$

19. Explain the difference between a function of two variables and a function of one variable.

A function of two variables has two inputs, such as x and y, while a function of one variable only has one input.

For 21 and 23: $W(v, T) = 91.4 - \frac{\left(10.45 + 6.68\sqrt{v} - 0.447v\right)(457 - 5T)}{110}$

21. $W(25, 30)$

$$= 91.4 - \frac{\left(10.45 + 6.68\sqrt{25} - 0.447(25)\right)(457 - 5(30))}{110} \approx 0^\circ\text{F} \tag{19}$$

23. $W(40, 20)$

$$= 91.4 - \frac{\left(10.45 + 6.68\sqrt{40} - 0.447(40)\right)(457 - 5(20))}{110} \approx -22^\circ\text{F} \tag{20}$$