

## 14.3 Answers

$$\textcircled{1} \quad a) \quad f_x = 8x, \quad f_y = -4y^3$$

$$b) \quad z_x = e^{5y}, \quad z_y = 5xe^{5y}$$

$$c) \quad g_x = 3y \cdot x^{y-1}, \quad g_y = 3x^y \ln x$$

$$d) \quad f_m = \ln(m+n^2) + \frac{m}{m+n^2}$$

$$f_n = \frac{2mn}{m+n^2}$$

$$e) \quad f_x = y^2 z^3, \quad f_y = 2xy z^3 + 2z$$

$$f_z = 3xy^2 z^2 + 2y$$

$$f) \quad f_x = \frac{y}{1+e^{2y}}, \quad f_y = \frac{-x(-1-e^{2y}+2ye^{2y})}{(1+e^{2y})^2}$$

$$\textcircled{2} \quad a) \quad 5/13 \quad b) \quad 2 \quad c) \quad -\frac{2}{25}$$

$$\textcircled{3} \quad \frac{\partial z}{\partial x} = \frac{yz \cos(xyz) - 1}{2 - xy \cos(xyz)}$$

$$\frac{\partial z}{\partial y} = \frac{3 - xz \cos(xyz)}{xy \cos(xyz) - 2}$$

4

$$f_{xx} = 6xy^2, \quad f_{xy} = 6x^2y - 8y^3$$

$$f_{yy} = 2x^3 - 24xy^2, \quad f_{yx} = \cancel{6x^2y - 8y^3} \\ 6x^2y - 8y^3$$

5 a)  $f_y = 8xy^3 + 2x^3y$

$$f_{yx} = 8y^3 + 6x^2y$$

$$f_{yxx} = 12xy$$

b)  $\frac{\partial^3 w}{\partial x^2 \partial y} = 0$

$$\frac{\partial^3 w}{\partial z \partial y \partial x} = \frac{4}{(2y+z)^3}$$

6 a)  $P_d(140, 3) \approx 0.0265$

b) Percentage Points  
drink

c) For a 140 lb person who has consumed 3 drinks, blood alcohol content is increasing by about 0.0265% per drink.