MATH 224

Selected Hints and Answers for Assignment 12

Chapter 4: 26, 27, 28 and 29

26: $f_{\mathbf{u}}(7,25) = \left(735, \frac{343}{10}\right) \cdot \left(\frac{3}{5}, \frac{-4}{5}\right)$:

27: Gradient at (1,6,2) is (288, 96, 432) and $|\mathbf{v}| = \sqrt{11}$. The directional derivative in the direction of $\mathbf{v}$ at (1,6,2) is $\frac{336}{\sqrt{11}} \approx 101.308$

For Exercises 28 and 29, you can use linear algebra software or row reduction to solve the linear system of equations

28: You may wind up with a system of two linear equations in two unknowns $f_x(3,2), f_y(3,2)$:

$$\begin{aligned} -3f_x(3,2) + 4f_y(3,2) &= 288 \\ -12f_x(3,2) + 5f_y(3,2) &= -36 \end{aligned}$$

The gradient of f at (3,2) is $\left(\frac{176}{7}, \frac{372}{7}\right)$

29: You may wind up with the system

$$\begin{pmatrix} 2 & 3 & 1 \\ -5 & -1 & 8 \\ 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} f_x(\mathbf{x} \\ f_y(\mathbf{x} \\ f_z(\mathbf{x} \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix}$$

The gradient of f at $\mathbf{x}$ is (-39, 19, 22).