MATH 223
*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 $\frac{336}{\sqrt{11}} \approx 101.308$

<span style="color:red">**For Exercises 28 and 29, you can use linear algebra software or row reduction to solve the linear system of equations**</span>

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

$$-3f_x(3, 2) + 4f_y(3, 2) = 288$$
$$-12f_x(3, 2) + 5f_y(3, 2) = -36$$

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).