1. Find the directional derivative of $f(x,y)=e^x\sin y$ at $(0,\frac{\pi}{3})$ in the direction of $\mathbf{v}=\langle -6,8\rangle$.

2. Suppose that the temperature at a point (x, y, z) in space is given by $T(x, y, z) = 80/(1 + x^2 + 2y^2 + 3z^2)$ where T is measured in degrees Celsius and x, y, z in meters. In which direction does the temperature increase fastest at the point (1, 1, -2)? What is the maximum rate of increase?

3. Find all points in which the direction of fastest change of the function $f(x,y) = x^2 + y^2 - 2x - 4y$ is $\mathbf{i} + \mathbf{j}$.