Answer the following problems.

1. Find the domain and the range of the function $f(x, y) = \ln(7 - x^2 - 7y^2)$

D: $7 - x^2 - 7y^2 > 0$

$7 > x^2 + 7y^2$

$\{(x,y) : 7 > x^2 + 7y^2\}$

R: max value is at $(x,y) = (0,0)$, so we have

$(-\infty, \ln(7)]$

2. Evaluate the following limit if exists.

$$\lim_{(x,y)\to(0,0)} \frac{y - 4x}{6x + 7y}$$

$\lim_{\substack{x=0 \\ y\to 0}} \frac{y}{7y} = \frac{1}{7}$

$\lim_{\substack{y=0 \\ x\to 0}} \frac{-4x}{6x} = \frac{-2}{3}$

$\therefore$ limit does not exist.