2 $f(x,y) = x^2y(1-x-y)$

$= x^2y - x^3y - x^2y^2$

$\frac{\partial f}{\partial x} = 2xy - 3x^2y - 2xy^2 = xy(2-3x-2y)$

$\frac{\partial f}{\partial y} = x^2 - x^3 - 2x^2y = x^2(1-x-2y).$

Critical points:

$f_x = 0 \iff x = 0$ or $y = 0$ or $2-3x-2y = 0.$

Case 1 $x = 0.$ Then $f_y = x^2(1-x-2y) = 0.$

So any point with $x = 0$ is a critical point

Case 2 $x \neq 0$ and $y = 0.$

Then $f_y = 0 \iff 1-x-2y = 0 \iff x = 1$

So $(1, 0)$ is a cr. pt.

Case 3. $x \neq 0$, $y \neq 0$, and $2 - 3x - 2y = 0$.

Then $f_y = 0 \iff 1 - x - 2y = 0$.

So we have

$$3x + 2y = 2$$
$$x + 2y = 1$$

Solve $x = \frac{1}{2}$ $y = \frac{1}{4}$

The critical points: