

1. Find the local max and min points, values, and saddle points of

$$f(x,y) = 12x^2 - 4x^3 + 6y^2 + 12xy$$

$$f_x = 24x - 12x^2 + 12y$$

$$f_y = 12y + 12x$$

$$f_{xx} = 24 - 24x$$

$$f_{yy} = 12$$

$$f_{xy} = 12$$

$$x = -y$$

$$24x - 12x^2 - 12x = 0$$

$$x = + \text{ or } - 1$$

$$Y = + \text{ or } - 1$$

$$(1, -1)$$

No min or max values

Saddle point at $(1, -1)$