

# Lecture 10 Quiz

$$1) f(x,y) = 12x^2 - 4x^3 + 6y^2 + 12xy$$

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

$$f_y = 12y + 12x$$

$$12x + 12y = 0$$

$$x = -y$$

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

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

$$12x(x-1) = 0$$

$$(0,0) \text{ or } (0,1)$$

$$x = 0, -1$$

$$y = 0, -1$$

$$f_{xx} = 24 - 24x \quad f_{xy} = 12 \quad f_{yy} = 12$$

$$f_{xx}(0,0) = 24 - 0 = 24$$

$D = 24(12) - 12^2 > 0$ . Because  $f_{xx}(0,0) > 0$ ,  
There is a local min  
at this point.  $\rightarrow (0,0,0)$ .

$$f_{xx}(1,-1) = 0$$

$D = (12) - 12^2 < 0$ . There is a saddle  
point at  $(1,-1,-10)$ .