

Spring 2010

(ii) Find & classify all CP's of  $f(x,y) = x^2 + x + 2xy + y$ .

$$f_x = 2x + 1 + 2y = 0 \rightarrow 2(-\frac{1}{2}) + 1 + 2y = 0$$

$$f_y = 2x + 1 = 0$$

$$x = -\frac{1}{2}$$

$$-1 + 1 + 2y = 0$$

$$y = 0$$

$$\text{CP: } (-\frac{1}{2}, 0)$$

$$f_{xx} = 2$$

$$f_{yy} = 0$$

$$f_{xy} = 2$$

$$f_{yx} = 2$$

$$2(0) - (2)^2 = -4 < 0$$

so  $(-\frac{1}{2}, 0)$  is a saddle point.