Quiz 10.

Q1. $f(x,y) = 12x^2 - 4x^3 + by^2 + 12xy$.

Answer: $f_x = \dfrac{d}{dx}(12x^2 - 4x^3 + 12xy) = 24x - 12x^2 + 12y$

$f_y = \dfrac{d}{dy}(\cancel{12x} + by^2 + 12xy) = 12y + 12x$

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

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

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

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

$x = 1$ or $x = 0$ $y = 0$ or -1

$f_{xx} = 24 - 24x$ $\therefore$ the critical point should be $(1,0)$ $(1,-1)$

$f_{xy} = 12$ $(0,0)$ $(0,-1)$

$f_{yy} = 12$

$D = -144$ $D(1,-1) = -144$ $D(0,0) = 144$
$(1,0)$ $D(0,-1) = 144$.

at $(1,0)$ & $(1,-1)$, it has neither max nor mini, that is saddle point.

at $(0,0)$ & $(0,-1)$ it has local minimum.