Attendance Quiz 10

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Section: ~~10:40 -~~
8:40 - 10:00 A.M.

1. Find the local maximum and minimum point(s), the local maximum and minimum values, and saddle point(s) of the function

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

Solution: $f_x(x,y) = 24x - 12x^2 + 12y$

$f_y(x,y) = 12y + 12x$

when $f_x(x,y) = f_y(x,y) = 0$.

$y = -x$.

$x - x^2 = 0$.

$x = 0$ or 1.

So the critical point is $(0,0)$ and $(1,-1)$

~~① For (0,0).~~

$f_{xx}(x,y) = 24 - 24x$.

$f_{yy}(x,y) = 12$

$f_{xy}(x,y) = 0$.

① For $(0,0)$.

$D = 288 - 288x > 0$.

and $f_{xx}(x,y) = 24 > 0$

$\therefore (0,0)$ is local minimum

$f(0,0) = 0$ is the local minimum value.

② For $(1,-1)$.

$D = 288 \cdot 0 - 288 = 0$.

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

there are (x,y) that make $f(x,y)$ larger or smaller.

$\therefore (1,-1)$ is a saddle point.