NAME: (print!) _Shaun Goda_ Section: _23_

E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3 p @gmail.com (Attachment: q10FirstLast.pdf) ASAP BUT NO LATER THAN Oct. 8, 8:00pm

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

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

$f_x(x,y) = 24x - 12x^2 + 12y \quad f_{xx}(x,y) = 24 - 24x \quad f_{xy}(x,y) = 12$

$f_y(x,y) = 12y + 12x \quad\quad f_{yy}(x,y) = 12$

$24x - 12x^2 + 12y = 0 \quad 12y + 12x = 0 \quad (0,0) \text{ and } (1,-1)$

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

$12x - 12x^2 = 0 \quad\quad 12y + 12(0) = 0$

$12x(1-x) = 0 \quad\quad\quad y = 0$

$x = 0 \quad\quad\quad 12y + 12(1) = 0$

$x = 1 \quad\quad\quad y = -1$

$\boxed{f_{xx}(0,0) = 24}$ $\quad\quad f_{xx}(1,-1) = 0$

$f_{yy}(0,0) = 12$ $\quad\quad f_{yy}(1,-1) = 12$

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

$24 \cdot 12 - (12)^2 = 144 \quad 0 \cdot 12 - 12^2 = \boxed{-144}$

local minimum $(0,0)$ $\quad\quad$ Saddle point $(1,-1)$