

"QUIZ" for Lecture 10

NAME: (print!) Gillian Mulvey Section: _____

E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@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

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

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

$$f_y = 12y + 12x$$

$$f_{xx} = 24 - 24x$$

$$f_{yy} = 12$$

$$f_{xy} = 12$$

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

$$12y + 12x = 0$$

$$24x - 12x^2 + 12(-x) = 0$$

$$12 = 0 \quad y + x = 0$$

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

$$y = -x$$

$$12x = 0$$

$$1 - x = 0$$

$$12y + 12(0) = 0$$

$$12y + 12(1) = 0$$

$$x = 0$$

$$x = 1$$

$$y = 0$$

$$12y = -12$$

$(0, 0)$ $(1, -1)$

$$y = -1$$

critical points

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

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

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

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

$$f_{yy}(0, 0) = 12$$

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

$$D(0, 0) = 24 \cdot 12 - (12)^2 = 144$$

$$D(1, -1) = 0 \cdot 12 - (12)^2 = -144$$

$D > 0$ $f_{xx} > 0$ so $(0, 0)$ is a local minimum

$(1, -1)$ saddle point