

"QUIZ" for Lecture 10

NAME: (print!) Orion Kress Sanfilippo Section: 2d

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

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

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

$$f_y = 12y + 12x = 0$$

$$f_{xx} = 24 - 24x = 0 \quad f_{xy} = 12$$

$$f_{yy} = 12 \quad \begin{bmatrix} f_{xx}(a,b) & f_{xy}(a,b) \\ f_{yx}(a,b) & f_{yy}(a,b) \end{bmatrix} \Rightarrow$$

$$\begin{aligned} 2x - x^2 + y &= 0 \\ x + y &= 0 \\ x &= -y \end{aligned}$$

$$\begin{aligned} x - x^2 &= 0 \\ (x+1)(x) &= 0 \end{aligned}$$

P_1	P_2
$x=1$	$x=0$
$y=-1$	$y=0$

$\therefore P_1$ Saddle Pt

$$D_1 = f_{xx}(1, -1) \cdot f_{yy}(1, -1) - 12^2 = 0 - 144 = -144 < 0$$

$$D_2 = f_{xx}(0, 0) \cdot f_{yy}(0, 0) - 12^2 = 288 - 144 = 144 > 0$$

$$f_{xx}(0, 0) = 24 > 0 \quad \text{Local Min} \leftarrow$$

P_t	Value of f	Category
$P_1 = (1, -1)$	$f(1, -1) = 2$	Saddle Point
$P_2 = (0, 0)$	$f(0, 0) = 0$	Local Min