

"QUIZ" for Lecture 10

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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

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

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

$$f_y = 12y + 12x$$

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

$$f_{xy} = 12$$

$$f_{yy} = 12$$

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

$$12x + 12y = 0$$

$$12y = -12x$$

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

$$12x(1-x) = 0 \quad x = 0, 1 \quad \text{Points: } (0, 0) \\ (1, -1)$$

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

$$y = 0$$

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

$$y = -1$$

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

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

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

$$D = f_{xx} \cdot f_{yy} - [f_{xy}]^2$$

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

$$D(1, -1) = 0 \cdot 12 - (12)^2 = -144 \quad \boxed{\text{Saddle point}}$$

Local min @ (0, 0)

Saddle point @ (1, -1)