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"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

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

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

$$f_y = 12y + 12x$$

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

$$f_{yy} = 12$$

$$f_{xy} = 12$$

$$\text{Cps: } (0, 0), (1, -1)$$

p_1

p_2

↳ local
min

↳ saddle
point

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

$$f_y = 12x + 12y = 12(x + y) = 0 \Rightarrow y = -x$$

$$x^2 - 2x - (-x) = 0$$

$$x^2 - 2x + x = 0$$

$$x^2 - x$$

$$x(x - 1) = 0$$

$$x = 0, 1$$

$$y = 0, -1$$

$$D_1 = f_{xx}(p_1) f_{yy}(p_1) - f_{xy}^2(p_1) = [24 - 24(0)] [12] - 12^2 = 144 > 0, f_{xx}(p_1) > 0 \text{ local min}$$

$$D_2 = f_{xx}(p_2) f_{yy}(p_2) - f_{xy}^2(p_2) = [24 - 24(1)] [12] - 12^2 = -144, \text{ saddle}$$