

ENGR 222

Assignment 2 Submission

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1. Multivariate Function

$$f(x, y) = -2x^3 + 3x^2y + 2y^3 - 9y + 5$$

(a)

$$\begin{aligned}f_x &= -6x^2 + 6xy \\f_y &= 3x^2 + 6y^2 - 9\end{aligned}$$

(b)

$$\begin{aligned}f_{xy} &= 6x \\f_{xx} &= -12x + 6y \\f_{yy} &= 12y\end{aligned}$$

(c)

$$\begin{aligned}f_x &= -6x^2 + 6xy = 0 \\f_y &= 3x^2 + 6y^2 - 9 = 0\end{aligned}$$

by inspection ($x = y = 1, -1$)

for $x = 0$,

$$\begin{aligned}f_x &= 0 \\f_y &= 6y^2 - 9 = 0\end{aligned}$$

$$\therefore y = \sqrt{9/6} = \sqrt{\frac{3}{2}}$$

for $y = 0$:

$$\begin{aligned}f_x &= -6x^2 = 0 \\f_y &= 3x^2 - 9 = 0\end{aligned}$$

no x

$$\text{extrema} \Rightarrow [(1, 1), (-1, -1), (0, \sqrt{\frac{3}{2}})]$$

2. Quick questions

(a)

(b)

(c)

(d)

(e)

3. Double integrals

- (a)
- (b)
- (c)
- (d)
- (e)

4. Lab question

- (a)
 - i.
 - ii.
 - iii.
- (b)
 - i.
 - ii.
 - iii.