King Fahd University of Petroleum and Minerals

Department of Mathematics and Statistics — Spring Semester (Term 162)

Quiz 3 — Calculus III — Dr. Taleb Alkurdi

Name_____ ID_____ Serial Number _____

Important Note: Please show your work in order to get the full grade. There is only one point for the final answer and the rest will be for the details of the work.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the absolute maxima and minima of the function on the given domain.

1) $f(x, y) = 4x + 6y$ on the closed triangular region with vertices $(0, 0)$, $(1, 0)$, and $(0, 1)$ 1) _____

A) Absolute maximum: 4 at $(1, 0)$; absolute minimum: 0 at $(0, 0)$
B) Absolute maximum: 6 at $(0, 1)$; absolute minimum: 0 at $(0, 0)$
C) Absolute maximum: 6 at $(0, 1)$; absolute minimum: 4 at $(1, 0)$
D) Absolute maximum: 10 at $(1, 1)$; absolute minimum: 4 at $(1, 0)$

Find all local extreme values of the given function and identify each as a local maximum, local minimum, or saddle point.

2) $f(x, y) = 4x^2 + 8xy + 16y^2$ 2) _____

A) $f(0, 0) = 0$, local minimum
B) $f(8, 8) = 1792$, local maximum
C) $f(2, 4) = 336$, saddle point; $f(4, 2) = 192$, saddle point
D) $f(8, 8) = 1792$, local maximum; $f(0, 0) = 0$, local minimum

Find the extreme values of the function subject to the given constraint.

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

A) Maximum: 1 at $(-1, -2, -3)$; minimum: -1 at $(1, 2, 3)$
B) Maximum: 9 at $(1, 2, -2)$; minimum: -9 at $(-1, -2, 2)$
C) Maximum: 1 at $(1, -2, -2)$; minimum: -1 at $(-1, 2, 2)$
D) Maximum: 8 at $(2, 1, -2)$; minimum: -8 at $(-2, -1, 2)$