MATH 105: PRACTICE PROBLEMS FOR CHAPTER 3: SPRING 2010

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Question 1 : Compute the partial derivatives of order 1 and order 2 for:
(1) $f(x, y, z) = e^{x+y} \cos(x) \sin(y)$.
(2) $g(x, y) = \sin(e^x / e^y)$.

Question 2 : Compute the second order Taylor series expansions of
(1) $A(x, y) = (x + y - 5)^3$.
(2) $f(x, y, z) = e^{x+y} \cos(x) \sin(y)$.
(3) $g(x, y) = \sin(e^{x-y} - 1)$.

Question 3 : Find the critical points of
(1) $A(x, y) = (x + y - 5)^3$.
(2) $B(x, y, z) = xy^2 + x^2 y$.

Question 4 : Find the candidates for the extrema of the functions below, subject to the given constraints.
(1) $f(x, y, z) = xy^2 z^3$ subject to $g(x, y, z) = x^2 + y^2 + z^2 = 1$.
(2) $f(x, y) = (x - 4)^2 + y^2$ subject to $g(x, y) = (x/5)^2 + (y/3)^2 = 1$.

Question 5 : Use the fact that the derivative of a sum is the sum of the derivatives to prove that the derivative of a sum of three terms is the sum of the three derivatives.

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