

Term Test 2

DATE: November 12, 2015
COURSE: MATH 2720

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TIME: 70 minutes
EXAMINER: G.I. Moghaddam

NAME: _____

STUDENT # : _____

Q1 [10]	Q2 [10]	Q3 [10]	Q4 [10]	Q5 [10]	Total [50]

1. Evaluate each of the following limits or explain why it does not exist.

[5] (a) $\lim_{(x,y) \rightarrow (1,0)} \frac{(x-1)y}{y^2 + (x-1)^2}$

[5] (b) $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 y^4}{4x^2 + y^2}$

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2. Let $f(x, y) = 1 + x \ln(xy - 1)$.

[3] (a) Show that the function f is differentiable at the point $(2, 1)$.

[4] (b) Find the linearization $L(x, y)$ of the function f at the point $(2, 1)$.

[3] (c) Use part (b) to approximate $f(2.01, 0.99)$.

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- [10] 3. If $g(s, t) = f(2t^3 - s^3, s^3 - 2t^3)$ and f is differentiable, show that g satisfies the equation

$$2t^2 g_s + s^2 g_t = 0 .$$

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4. Let $P(\sqrt{2}, 0, \sqrt{2})$ be a point and suppose that the temperature at a point (x, y, z) in space is given by $T(x, y, z) = e^{x^2+y^2-z^2}$.

[6] (a) Find the rate of change of the temperature at the point P in the direction of the vector $\mathbf{u} = (1, -4, -1)$.

[2] (b) In which direction does the temperature increase fastest at P ?

[2] (c) Find the maximum rate of increase at P .

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- [10] 5. Find and classify all critical points of $f(x, y) = 3xy - x^2y + xy^2$.
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