



Bilkent University

Quiz # 09
Math 102 Section 08 Calculus II
15 April 2024 Monday
Instructor: Ali Sinan Sertöz



Name & Lastname:

Department:

Student ID:

Q-1) Let $z = z(x, y)$, $x = x(u, v)$, $y = y(u, v)$, $u = u(s, t)$ and $v = v(s, t)$ be differentiable functions of their variables. We have the following data:

$u(3, 7) = 9$	$v(3, 7) = 11$	$u(7, 3) = -9$	$u(7, 3) = -10$
$u_s(3, 7) = 12$	$v_s(3, 7) = -1$	$u_t(3, 7) = 2$	$v_t(3, 7) = -3$
$x(9, 11) = -3$	$y(9, 11) = 3$	$x(3, 7) = 12$	$y(3, 7) = -8$
$x_u(9, 11) = 4$	$y_u(9, 11) = 5$	$x_u(3, 7) = -12$	$y_u(3, 7) = 6$
$x_v(9, 11) = -6$	$y_v(9, 11) = 7$	$x_v(3, 7) = 4$	$y_v(3, 7) = 14$
$z(-3, 3) = 16$	$z(9, 11) = 17$	$z(3, 7) = 18$	$z(12, -8) = 19$
$z_x(-3, 3) = -2$	$z_y(-3, 3) = 9$	$z_x(9, 11) = 2$	$z_y(9, 11) = -9$
$z_x(3, 7) = 5$	$z_y(3, 7) = 13$	$z_x(12, -8) = -5$	$z_y(12, -8) = -7$

Fill in the following boxes with numbers using this table. No questions asked!

$$\left. \frac{\partial x}{\partial s} \right|_{(s,t)=(3,7)} = \boxed{}$$

$$\left. \frac{\partial y}{\partial t} \right|_{(s,t)=(3,7)} = \boxed{}$$

$$\left. \frac{\partial z}{\partial s} \right|_{(s,t)=(3,7)} = \boxed{}$$

$$\left. \frac{\partial z}{\partial t} \right|_{(s,t)=(3,7)} = \boxed{}$$

The linearization of z as a function of x and y at the point $(x, y) = (12, -8)$ is

$$L(x, y) = \boxed{} + \boxed{}x + \boxed{}y$$

The linearization of z as a function of s and t at the point $(s, t) = (3, 7)$ is

$$L(s, t) = \boxed{} + \boxed{}s + \boxed{}t$$

Grading: Each correctly filled box is 1 point. Grader: melis.gezer@bilkent.edu.tr