

Name: \_\_\_\_\_

<b>INSTRUCTIONS.</b> Print your name on the line above.
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1. Let  $f(x, y) = x^2e^{-2y}$ .

(a) Compute the directional derivative of  $f(x, y)$  at the point  $P(5, 1)$  in the direction of the vector  $\mathbf{v} = \langle 12, 5 \rangle$ .

(b) Give the direction of maximal rate of change of  $f(x, y)$  at the point  $P(1, 5)$ .

2. Let  $g(x, y) = x - ye^x$ .

(a) Find the tangent plane to the graph  $z = g(x, y)$  at the point  $(0, 0, 0)$ .

(b) Compute the linear approximation  $L(x, y)$  to  $g(x, y)$  near  $(0, 0, 0)$ .

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1. Let  $f(x, y) = y^2 e^{-2x}$ .

(a) Compute the directional derivative of  $f(x, y)$  at the point  $P(1, 5)$  in the direction of the vector  $\mathbf{v} = \langle 5, 12 \rangle$ .

(b) Give the direction of maximal rate of change of  $f(x, y)$  at the point  $P(5, 1)$ .

2. Let  $h(x, y) = y - xe^y$ .

(a) Find the tangent plane to the graph  $z = h(x, y)$  at the point  $(0, 0, 0)$ .

(b) Compute the linear approximation  $L(x, y)$  to  $h(x, y)$  near  $(0, 0, 0)$ .