

## Exercises:

① Compute  $f_x$  &  $f_y$

a.  $f(x, y) = y/x + y$

b.  $f(x, y) = \ln(x^2 + xy)$

c.  $f(x, y) = \sin x \cdot \cos y$

② 15.3 #10 in textbook

③ For  $f(x, y) = 3x^2y + 4x^3y^2 - 7xy^5$ ,  $f_x(1, 2)$

④ For  $g(x, y) = xy/(x-y)$   $g_{xy}(1, 0)$

⑤ Challenge, but a good one to try:

$$f(x, y, u, v) = \frac{x^2 + e^y v}{3y^2 + \ln(2 + u^2)}$$

Show  $f_{uvxyuv} = 0$

Hint: Choose a different order

⑥ Compute the gradient

a.  $f(x, y) = \cos(x^2 + y)$

b.  $h(x, y, z) = xyz^{-3}$

⑦ Compute directional derivative of  $f$  in dir. specified by  $v$ , at the point  $P$

a.  $f(x, y) = x^2 + y^3$ ,  $v = \langle 4, 3 \rangle$ ,  $P = (1, 2)$

b.  $f(x, y) = x^2 y^3$ ,  $v = i + j$ ,  $P = (1/6, 3)$

c.  $g(x, y, z) = x \ln(y + z)$ ,  $v = 2i - j + k$ ,  $P = (2, e, e)$