

# Calc 3: Assignment 14

Note Title

10/6/2011

① If  $f(x,y) = x y^2 + 3x - y^2$ , use the definition of partial derivatives to find  $f_x$  and  $f_y$ .

② Find all partial derivatives for

a)  $f(x,y) = x \sin(y^2) + 3x^2 y^3$

b)  $f(x,y) = \frac{x+y}{xy}$

c)  $f(x,y,z) = x y^2 \cos(z x^2)$

d)  $f(x,y,z) = \sqrt{x^2 + y^2 + z^2}$

③ If  $f(x,y) = x \ln(xy)$ , find the second-order partials  $f_{xx}$ ,  $f_{xy}$ ,  $f_{yy}$ ,  $f_{yx}$ .

④ For  $f(x,y) = x y^2 + x^3 y^3$  find  $f_{xx}$ ,  $f_{xy}$ ,  $f_{yy}$ ,  $f_{yx}$ .  
Do you notice anything? Make a conjecture!

⑤ For  $f(x,y,z) = z x^2 y^3$ , find all 2<sup>nd</sup>-order partials. How many are there? How about your conjecture from ④?

⑥ How many 1<sup>st</sup> order, 2<sup>nd</sup> order, 3<sup>rd</sup> order, etc partials are there for a)  $f(x, y)$

b)  $f(x, y, z)$

Will they all be different?

⑦ For  $f(x, y, z) = x^2 y^2 z - z^2 x y$ , find

a)  $f_{xyz}$

b)  $f_{yxx}$

c)  $f_{zxy}$

d)  $f_{xyxzyz}$  e)  $f_{zzyyx}$

Conjecture the answers for 4<sup>th</sup> degree partials or higher for  $f(x, y)$ .