Sections 15.6, 15.7   Name: ____________

Math 1920 - Andres Fernandez   October 2, 2018

Problems

(1) Use the chain rule to compute the partial derivatives:

(a) Find $\frac{\partial f}{\partial v}$, $\frac{\partial f}{\partial u}$ given $\quad f(x,y) = \cos(x-y), \quad x = 3u - 5v \quad$ and $\quad y = -7u + 15v.$

(b) Find $\frac{\partial f}{\partial \theta}$ given $\quad f(x,y,z) = xy - z^2, \quad x = r\cos\theta, \quad y = \cos^2\theta \quad$ and $\quad z = r.$

(2) Compute $\frac{\partial z}{\partial y}$ where $e^{xy} + \sin(xz) + y = 0$.

(3) Suppose that f is a function of x and y, where $x = g(t,s)$ and $y = h(t,s)$. Show that f_{tt} is equal to

$$f_{xx}\left(\frac{\partial x}{\partial t}\right)^2 + 2f_{xy}\left(\frac{\partial x}{\partial t}\right)\left(\frac{\partial y}{\partial t}\right) + f_{yy}\left(\frac{\partial y}{\partial t}\right)^2 + f_x\left(\frac{\partial^2 x}{\partial^2 t}\right) + f_y\left(\frac{\partial^2 x}{\partial^2 t}\right)$$

(4) Find critical points of the following functions. Determine whether they are local maxima, minima or saddle points.

(a) $xy^3 + 2y - x - 5$

(b) $e^x - xe^y$

(c) x ln(x+y)

(5) What is the point in the plane $2x - 6y + z = 7$ that is closest to $P = (1,1,1)$