Math 2471 Calc 3 - Homework #5

Pg. 909, #3, 7, 11, 12 and 15

Pg. 917, #7, 11, 15, 16*, and 19

pg. 928, #7, 9 ,11, 13, 15, 17 and 29

Pg. 909 Find the total differential for the following

$$\#3 \quad z = 5x^3y^2$$

$$\#7 \quad w = x^2yz^2 + \sin(yz)$$

For the following calculate (a) $f(2,1)$ and $f(2.1,1.05)$ and calculate Δz and (b) use the total differential to find dz

$$\#11 \quad f(x,y) = 16 - x^2 - y^2$$

$$\#12 \quad f(x,y) = y/x$$

In the following find $z = f(x,y)$ and use the total differential to approximate the quantity

$$\#15 \quad (2.01)^2(9.02) - 2^2 \cdot 9$$

Pg. 917 Using the appropriate <u>chain rule</u> calculate either dw/dt or $\partial w/\partial s$ and $\partial w/\partial t$ the following:

$$\#7 \quad w = x - \frac{1}{y}, \quad x = e^{2t}, \ y = t^3$$

$$\#11 \quad w = xy + xz + yz, \quad x = t-1, \ y = t^2 - 1, \ z = t$$

$$\#15 \quad w = x^2 + y^2, \quad x = s+t, \ y = s - t$$

$$\#16 \quad w = y^3 - 3x^2y, \quad x = t^2 + s^2, y = 2ts, \ (*)$$

$$\#19 \quad w = xyz, \quad x = s+t, \ y = s - t, \ z = st^2$$

Pg. 928 Find the directional derivative for the following in either the direction of $\vec{v}$ or the direction of $\overrightarrow{PQ}$.

$$\#7 \quad f(x,y) = 3x - 4xy + 9y, \quad P(1,2), \ \vec{v} = \frac{3}{5}\vec{i} + \frac{4}{5}\vec{j}$$

$$\#9 \quad g(x,y) = \sqrt{x^2 + y^2}, \quad P(3,4), \ \vec{v} = 3\vec{i} - 4\vec{j}$$

$$\#11 \quad f(x,y) = x^2 + 3y^2, \quad P(1,1), \ Q(4,5)$$

$$\#13 \quad f(x,y) = e^y \sin x, \quad P(0,0), \ Q(2,1)$$

Find the gradient of the following at the given point and the maximum value (# 29 only)

$$\#15 \quad f(x,y) = 3x + 5y^2 + 1, \quad (2,1)$$

$$\#17 \quad f(x,y) = \frac{\ln(x^2 - y)}{x} - 4, \quad (2,3)$$

$$\#29 \quad f(x,y) = y^2 - x\sqrt{y}, \quad (0,3)$$

(*) I changed the problem slightly from the text.

Due: Fri. June 19, 2020.