#ATTENDANCE QUIZ for Lecture 7 of Math251(Dr. Z.)
#EMAIL RIGHT AFTER YOU WATCHED THE VIDEO
#BUT NO LATER THAN Sept. 28, 2020, 8:00PM (Rutgers time)
#THIS .txt FILE (EDITED WITH YOUR ANSWERS)
#TO:
#DrZcalc3@gmail.com
#Subject: aq7
#with an ATTACHMENT CALLED:
#aq7FirstLast.txt
#(e.g. aq7DoronZeilberger.txt)

#LIST ALL THE ATTENDANCE QUESTIONS FOLLOWED BY THEIR ANSWERS

1) Let a be the 5^{th} digit of your RUID. Let b be the 2nd digit of your RUID. Let $f(x,y) = x^a + bx^{2a}y^3$. Find the partial derivatives with respect to f_x(x,y) and f_y(x,y)

$f(x,y) = x^0 + bx^0y^3 = 1 + 9y^3$

$\frac{\delta}{\partial x} f(x,y) = 0 \qquad \frac{d}{\delta y} f(x,y) = 0 + 27y^2$

2) With a and b as above, fix f_x(z(x,y)) and f_y(z(x,y)) IF x,y,z are related by the Relationship equation

$x^a y^2 z^b + x^2 y^{3b} z^3 = e^{xyz}$

$y^2 z^9 + x^2 y^{27} z^3 = e^{xyz}$

$\frac{d}{\delta x}\left(y^2 z^9 + x^2 y^{27} z^3 = e^{xyz}\right)$

$$y^2 9z^8 z' + y^{27}[x^2 z^3]' = (e^{xyz})'$$

$$y^2 9z^8 z' + y^{27}[3x^2 z^2 z' + 2xz^3] = e^{(xyz)'}$$

$$y^2 9z^8 z' + 3x^2 y^{27} z^2 z' + 2xy^{27} z^3 = e^{y(xz'+z)}$$

$$y^2 9z^8 z' + 3x^2 y^{27} z^2 z' + 2xy^{27} z^3 = e^{xyz'} \cdot e^{yz}$$

$$\frac{y^2 9z^8 z' + 3x^2 y^{27} z^2 z'}{e^{xyz'}} = e^{yz} - 2xy^{27} z^3$$

$$\frac{z'}{e^{xyz'}}\left(y^2 9z^8 + 9x^2 y^{27} z^2\right) = e^{yz} - 2xy^{27} z^3$$

$$\ln\left(\frac{z'}{e^{xyz'}}\right) = \ln\left(\frac{e^{yz} - 2xy^{27} z^3}{y^2 9z^8 + 9x^2 y^{27} z^2}\right)$$

$$\ln(z') - xyz' = ?$$

$$\frac{\delta}{\delta y}\left(\left(y^2 z^9 + x^2 y^{27} z^3\right) = e^{xyz}\right)$$

$$y^2 \cdot 9z^8 z' + z^9 \cdot 2y + x^2 y^{27} 3z^2 z' + x^2 \cdot 27y^{26} \cdot z^3 = e^{xyz'} \cdot e^{x}$$

? confused

3) Do the second part. Find $F_y(1,1)$

$z: x^2+y^2 = xyz + xyz^5$ $\quad z=1$

$0 + 2y = x(yz)' + x(yz^5)'$

$2y = x(yz'+z) + x(5yz^4z' + z^5)$

$2y = xyz' + xz + 5xyz^4z' + xz^5$

$\frac{2y - xz - xz^5}{xy + 5xy} = z' = 0$

4) Is the answer the same, Is $F_y(1,1)$ also zero? Could you have predicted it without calculation?

Yes the answer is the same. You could predict this because x and y have the same degree on both sides of the equation. So its repetitive process with a different variable

5) Find the equation of the tangent plane to the surface. (Let a and b be the same above)

$z = x^a + y^b + abxy$ At the point $(1,1,2+a\cdot b)$

$z = x^0 + y^9 + 0$

$z = 1 + y^9$ @ $(1,1,2)$

$\boxed{z - 2 = (y-1)\cdot 9}$

$d/z = 9y^8 = 9$

$dy\Big|_{y=1}$