MIDTERM 1 FOR Multivariable Calculus, Math 251(22-24), FALL 2020, Dr. Z.

NAME: Avery Turnbull

RUID: 193004962

EMAIL: at891@scarletmail.rutgers.edu

BELOW WRITE THE LIST OF THE ANSWERS

Answer[1]=.5

Answer[2]=Decreasing

Answer[3]=57/sqrt(11)

Answer[4]=e^(x-1) * -(x-1)e^(y-4) - (-e^y-4)^2

Answer[5]= Point B

Answer[6]= DNE

Answer[7]= 54/9^3

Answer[8]=9

Answer[9]=

Answer[10]=(1,4,3)

Instructions: Download this file with its original name, mt1.txt, then rename it, in your computer

mt1FirstLast.txt

Edit it with your answers and solutions

USING COMPUTEREZE: e.g.: x times y IS x*y, x to the power y is x^y

and Email DrZcalc3@gmail.com, 80 minutes (or sooner) after starting (for most people 10:00am, Oct. 15)

Subject: mt1

with an attachment. YOU MUST NAME IT EXACTLY

mt1FirstLast.txt

For each of the questions you MUST first figure, YOUR version, with the following convention

For i=1,2,3,4,5,6,7,8,9 , a[i]:= The i-th digit of your RUID, BUT of it is zero make it 1

Example: RUID=413200125;

a[1] = 4, a[2] = 1, a[3] = 3, a[4] = 2, a[5] = 1, a[6] = 1, a[7] = 1, a[8] = 2, a[9] = 5

HERE WRITE THE ACTUAL a[i]

a[1]= , a[2]= , a[3]= , a[4]=0 , a[5]= , a[6]= , a[7]= , a[8]= , a[9]=

Problem 1:

Find dz/dy at the point (1,1,1) if z(x,y) is given implicitly by the equation

x^a[1]+y^a[2]+z^a[3]+a[5]*x*y*z^2 = 3+a[5]

With my RUID data the question is

Here is how I do it (Explain everything)

I took my equation and too the partial derivative of z and divided by the partial derivative of y. I then plugged in the given point and solved

Ans.:

Problem 2:

Suppose that grad(f)(P)=<a[1],-a[4],a[7]+2>. Is f increasing or decreasing at the direction <a[1],a[3],-a[5]>?

With my RUID data the question is

Here is how I do it (Explain everything)

After I take the directional derivative I get a negative solution meaning it is decreasing

Ans.:

Problem 3:

Find the directional derivative of the function f(x,y,z)

x^3*a[6]+y^3*a[3]+z^3*a[8]

At the point P=(1,-1,1) in the direction pointing to Q=(1,-1,3)

With my RUID data the question is

After constructing the function I find Fx, Fy, and Fz by taking the impartial derivatives to get my gradient. I then take the magnitude of point Q. After this I divide the point Q by this magnitude to get my u. After plugging point P into my gradient I take the dot product of the gradient and u

Here is how I do it (Explain everything)

Ans.:

Problem 4:

Find a saddle point of the function f(x,y)=

exp(x-a[4])-(x-a[4])*exp(y-a[6])

If there is no saddle point, write in the Answers: "Does Not exist". Explain what you are doing

With my RUID data the question is

Here is how I do it (Explain everything)
I took the impartial derivative twice to get Fx, Fy, Fxx, Fyy, Fxy and plugged everything into my equation.

Ans.:

Problem 5:

Let f(x,y) be the function

a[4]*x + a[7]*y + a[2]

Find the ABSOLUTE MINIMUM VALUE of f(x,y) INSIDE the TRIANGLE whose VERTICES ARE

A = [a[1], a[2]], B = [a[3], a[4]], C = [a[5], a[6]]

With my RUID data the question is

Here is how I do it (Explain everything)

After taking my initial function I plug in each value for the points of x and y and whichever point gave me the lowest value was my minimum

Ans.:

Problem 6:

Let f(x,y) be the function

(x^2*a[4]^2-y^2*a[5]^2)/(x*a[4]-y*a[5])

Find the LIMIT of f(x,y) as (x,y) goes to the point [a[5],a[4]], or show that it does not exist

With my RUID data the question is

Here is how I do it (Explain everything)

I use the y-b=c*(x-a) and from there I solve for y using this equation and plug it into my original equation. Then I plug in 1 but the limit depends on C so the answer is DNE

Problem 7:

Find the curvature of the curve

r(t) = [a[1], a[2]*t, a[3]*t^2]

At the point (a[1],0,0)

With my RUID data the question is

Here is how I do it (Explain everything)

II simplye used the curvature equation which is | r'(t) x r''(t) | / (r'(t))^3

Problem 8:

A particle is moving in the plane with ACCELERATION given by

[-a[1]*sin(t), -a[2]*cos(t)]

At time t=0 its position is , [0, a[2]]

and its velocity is , [a[1], 0]

Where is it located at time , t = Pi

With my RUID data the question is

Here is how I do it (Explain everything)

I would integrate acceleration to get velocity at the given time and and find C before plugging it back into the function. I then plug in my value of to my answer.

Problem 9:

A certain function depends on variables x and y

Right now the rate of change of the function with respect to x is, a[5]

and the rate of change of the function with respect to y is, a[7]

Both x and y depend on time

Right now the rate of change of x with respect to time is, a[1]

and the rate of change of y with respect to time is, a[9]

How fast is the function changing right now?

With my RUID data the question is

Here is how I do it (Explain everything)

Problem 10:

Find the point of intersection of the three planes

x = a[5], y = a[7], z = a[3]

With my RUID data the question is

Here is how I do it (Explain everything)

The points that are given create the intersection of the three planes