Vector Functions & Functions of Several Variables (Group 2)

Teddy (Domain, Range/Level Lines):

1. Find the domain & range of the function z=f(x,y)=$\sqrt{25-x^2-y^2}$

2. Find the domain & range of the function z=f(x,y)= $\sqrt{2y-3x+6}$

3. Find the domain, range, level lines & graph of the function z=f(x,y)=ln$(3y-x^2)$

4. Find the domain, range, level lines & graph of the function z=f(x,y)=$\sqrt{x^2+y^2}$

Emily (Partial Derivatives):

1. Find$\frac{df}{dx}$ and $\frac{df}{dy}$ f(x,y)= 5xy- 7x^2- y²+ 3x- 6y+2

2. Find$\frac{df}{dx}$ and $\frac{df}{dy}$ f(x,y) = e^{xy} ln y + cos² (3x-y²)

Wade (Limits: Methods 1 & 2):

1. Find $\lim_{(x,y)\to(0,0)} \frac{-5e^{-y}sin(4x)}{2x}$
2. Find $\lim_{(x,y)\to(3,0)} \frac{\sqrt{3x-y}-3}{3x-y-9}$ by rewriting the fraction first. *3x - y ≠ 9*

Kaitlyn (Limits: Methods 3 & 4):

1. Show that $\lim_{(x,y)\to(0,0)} \frac{xy^2}{x^2+y^8}$ does not exist by approaching the limit from different directions

2. Show that $\lim_{(x,y)\to(0,0)} \frac{x^5-yx^4}{(x^2+y^2)^{5/2}}$ does not exist by converting the limit to polar coordinates

Amanda Karram (Notation, TNB, Curvature):

1. Find T, N, B and k (curvature) for r(t)= $< 12\,sin(t)i\, + 12\,cos(t)j\, + 9tk\, >$.

2. Find the tangent line to the graph of r(t)= $< t, -sin(t), cos(t) >$ at t=0. tE[-π, π]

Regan (Location and Intersections):

1) Does **r**(t) $=< \boldsymbol{tcost, tsint, t} > t$ =[-π,π] lie on the cone $x^2 + y^2 + z^2 = 0$? Prove your answer.

2) What is the intersection of the curve **r**(t) $=< \boldsymbol{tcost, tsint, t} >$

a) With the plane $z = \pi/2$?

b) With the plane $x - 2z = 0$?

Jake (Gradients and Directional Derivatives):

Gradients

1. Compute the gradient of f(x,y)=$25 - x^2 - y^2$ at the point (3,4).

2. Compute the gradient of f(x,y)=$(tan(x + y^2))/e^{3xy}$at the point (□/3,0).

Directional Derivatives

3. Find the directional derivative of f(x,y)=$e^{xy} + 3x^2y$ at (0,2) in the direction of v=<cos(□/3), sin(□/3)>

4. Find $D_v f$(1,0,1/2) for f(x,y,z)=cos(xy)+e^{yz}+ln(xz) in the direction v=i+2j+2k

Robert Delaney (Length):

1. Calculate the length of the following vector function.

r(t)=<cos(5t), 5t, sin(5t)> $0 \leq t \leq \boldsymbol{\pi}/4$

2. Calculate the length of the following vector function.

r(t)=$(3e^t sint)i + (3e^t)j + (3e^t cost)k$ $-\ln(4) \leq t \leq \ln(4)$