MATH 2311-Quizz#2

Name: Key: Number:

Question 1 Consider the curve $\mathbf{r}(t) = \cosh t\mathbf{i} - \sinh t\mathbf{j} + t\mathbf{k}$. Find the following

(a) The velocity $\mathbf{v}(t)$ (1)

$\vec{v}(t) = \sinh t\, i - \cosh t\, j + k$

(b) The speed $|\mathbf{v}(t)|$ (1)

$|\vec{v}| = \sqrt{\cosh^2 t + \sinh^2 t + 1} = \sqrt{2}\cosh t$

(c) The acceleration $\mathbf{a}(t)$ (1)

$\vec{a}(t) = \cosh t\, i - \sinh t\, j + 0k$

(d) $\mathbf{v}(t) \times \mathbf{a}(t)$ (2)

$$\begin{vmatrix} i & j & k \\ \sinh t & -\cosh t & 1 \\ \cosh t & -\sinh t & 0 \end{vmatrix}$$

$= \sinh t\, i + \cosh t\, j + k$

(e) $|\mathbf{v}(t) \times \mathbf{a}(t)|$ (1)

$|\vec{v} \times \vec{a}| = \sqrt{2}\cosh t$

(f) The curvature $\kappa = \frac{|\mathbf{v}\times\mathbf{a}|}{|\mathbf{v}|^3} = \frac{\sqrt{2}\cosh t}{2\sqrt{2}\cosh^3 t}$ (1)

$= \frac{1}{2}\operatorname{sech}^2 t$

(g) Find a_T and a_N. (3)

$a_T = \frac{d}{dt}|\vec{v}| = \sqrt{2}\sinh t$

$a_N = \kappa |\vec{v}|^2 = \frac{1}{2\cosh^2 t} \cdot 2\cosh^2 t = 1.$

MATH 2311-Quizz#3

Name:.....key..... Number:.....

Question 1 Consider the function $f(x,y) = \ln(x^2+y^2-1)$. Find the following

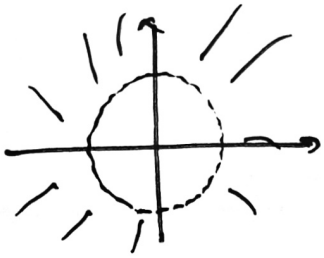
(2) (a) Domain of f.

$D = \{(x,y) \mid x^2+y^2 > 1\}$

(2) (b) Range of f

$(-\infty, \infty)$

(1) (c) Sketch the domain.



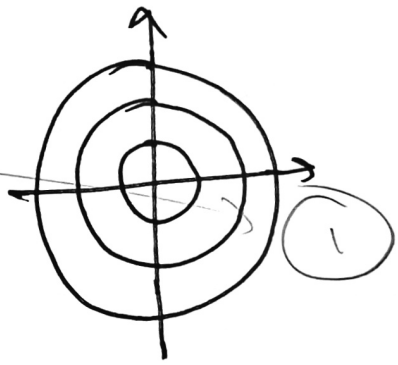
(1) (d) Find the boundary of the domain.

$\{(x,y) \mid x^2+y^2 = 1\}$

(2) (e) Sketch some level curves of f.

$\ln(x^2+y^2-1) = c$

(1) $x^2+y^2 = e^c+1$ Circles



(1) (f) Is the domain open or closed.

open.

(1) (g) Is the domain bounded or unbounded.

unbounded.

MATH 2311-Quizz#4

Name:.....key..... Number:.....

Question 1 Find the limit or show it does not exist

(a) $\lim_{(x,y)\to(1,1)} \frac{x^4-y^4}{x-y}$

(2) $= \lim_{(x,y)\to(1,1)} \frac{(x-y)(x+y)(x^2+y^2)}{x-y} = 4$

(b) $\lim_{(x,y)\to(0,0)} \frac{x^2y}{x^2+y^2}$

(2) $= \lim_{r\to 0} \frac{r^3\cos^2\theta\sin\theta}{r^2} = 0$

(c) $\lim_{(x,y)\to(0,0)} \frac{x-y}{x+y}$ $\quad y=mx$

(2) $= \lim_{(x,y)\to(0,0)} \frac{x(1-m)}{x(1+m)} = \frac{1-m}{1+m}$ DNE

Question 2 Let $f(x,y)=\tan(xy)$. Find $f_x, f_y, f_{xx}, f_{yy}, f_{xy}$.

(2) $f_x = y\sec^2(xy)$, $f_y = x\sec^2(xy)$ (1)

(1) $f_{xx} = 2y^2\sec^2(xy)\tan(xy)$

(1) $f_{yy} = 2x^2\sec^2(xy)\tan(xy)$

(1) $f_{xy} = \sec^2(xy) + 2xy\sec^2(xy)\tan(xy)$.