Name: _____ Panther ID: _____

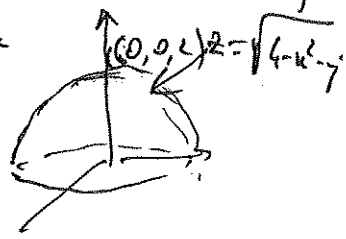
Quiz 10/17 MAC-2313 Fall 2017

To receive credit you MUST SHOW ALL YOUR WORK. Answers which are not supported by work will not be considered.

1. (3 pts) Specify the domain of the function $f(x,y) = \sqrt{4-x^2-y^2}$ and sketch its graph (domain 1pt, graph 2pts).

Domain $= \{(x,y) \mid x^2+y^2 \le 4\}$ ← the inside (and boundary) of the disk

$z = \sqrt{4-x^2-y^2} \Rightarrow z^2 = 4-x^2-y^2 \Rightarrow x^2+y^2+z^2 = 4$



Graph is a hemisphere with center $(0,0,0)$

2. (4 pts) Compute the limit, if it exists. If it does not exist, give an explanation to justify.

$$\lim_{(x,y)\to(0,0)} \frac{\tan(x^2+y^2)}{\sqrt{x^2+y^2}} = \lim_{r\to 0^+} \frac{\tan(r^2)}{r} = \lim_{r\to 0^+} \frac{r\cdot\tan(r^2)}{r^2}$$

use polar coords.

$= 0 \cdot 1 = 0$ (using $\lim_{\theta\to 0} \frac{\tan\theta}{\theta} = 1$)

l'Hopital could also be applied for that $\lim_{r\to 0^+} \frac{\tan(r^2)}{r} \overset{0}{=} \lim_{r\to 0} \frac{\sec^2(r^2)\cdot 2r}{1} = 1\cdot 0 = 0$

3. (4 pts) Let $z = \sin(y^2 - 4x)$. Find each of the following:

(a) $\frac{\partial z}{\partial x} = \cos(y^2-4x)\cdot(-4)$ (b) $\frac{\partial z}{\partial y} = \cos(y^2-4x)\cdot 2y$

(c) (1 pt) the rate of change of z with respect to x at the point $(2,1)$ with y held fixed.

$$\frac{\partial z}{\partial x}(2,1) = (-4)\cos(1^2-4\cdot 2) = -4\cos(-7) = -4\cos 7$$