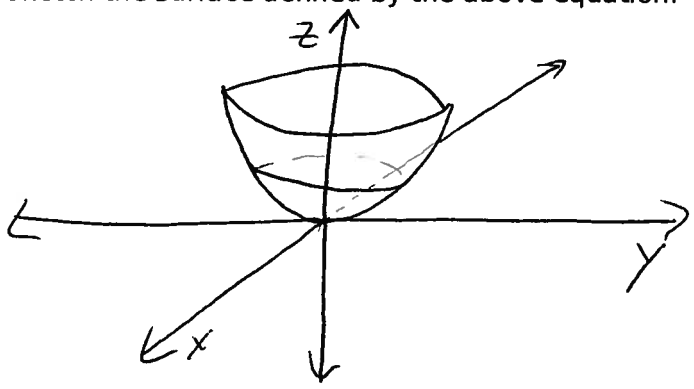
Math2210 Quiz 5 (Sections 12.1, 12.2) Summer, 2012 Dylan Zwick

Name Key Date 7-16-2012

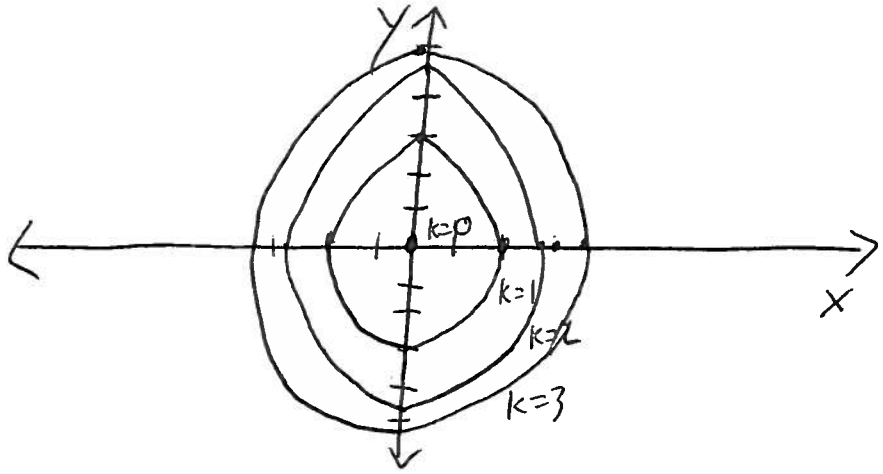
Instructions: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated.

1. Let $f(x,y)=\frac{x^2}{4}+\frac{y^2}{9}$.

(a) Sketch the surface defined by the above equation:



(b) Sketch the level curves for $f(x,y)=k$ where $k=0,1,2,3$



(c) What the the domain? Domain:

All of $\mathbb{R}^2$.

2. Find the slope of the tangent to the curve of intersection of the surface $z=4x^2+3xy^2-2xy+\sin(\frac{\pi}{2}x)+3y^2$ and the plane $x=0$ at the point $(0,2,12)$.

$$\frac{\partial z}{\partial y} = 6xy - 2x + 6y$$

$$\frac{\partial z}{\partial y}(0,2) = 6(0)(2) - 2(0) + 6(2) = 12$$

slope = $\boxed{12}$

3. For the above surface $z=4x^2+3xy^2-2xy+\sin(\frac{\pi}{2}x)+3y^2$ calculate:

(a) $\frac{\partial z}{\partial x}$.

$$\frac{\partial z}{\partial x} = 8x + 3y^2 - 2y + \frac{\pi}{2}\cos\left(\frac{\pi}{2}x\right)$$

Answer: $8x+3y^2-2y+\frac{\pi}{2}\cos(\frac{\pi}{2}x)$

(b) $\frac{\partial^2 z}{\partial y^2}$

$$\frac{\partial^2 z}{\partial y^2} = 6x + 6$$

Answer: $6x+6$

(c) $\frac{\partial^2 z}{\partial x \partial y}$

$$\frac{\partial^2 z}{\partial x \partial y} = 6y - 2$$

Answer: $6y-2$