Math 10a
Derek Wise

32/30
max score.

Quiz 2

Name: Derek Wise
(Key)

1) Consider the following matrices:

$$A = \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 1 & 3 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \qquad C = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \end{bmatrix}$$

a) Calculate $AB$ and $BC$

$$AB = \begin{bmatrix} 0 & 1 \\ 1 & 2 \\ 3 & 1 \end{bmatrix}$$

(5 pts)

$$BC = \begin{bmatrix} 1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

b) Is $CA + B$ defined? If so, calculate it; if not, explain why not.

$$CA + B = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 1 & 3 \end{bmatrix} + \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 4 & 4 \\ -1 & -1 \end{bmatrix} + \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

(5 pts)

$$= \begin{bmatrix} 4 & 5 \\ 0 & -1 \end{bmatrix}$$

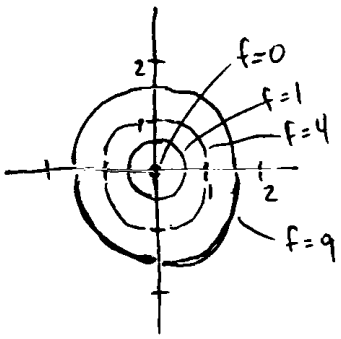
2) Let $f: \mathbb{R}^2 \to \mathbb{R}$ be the function defined by

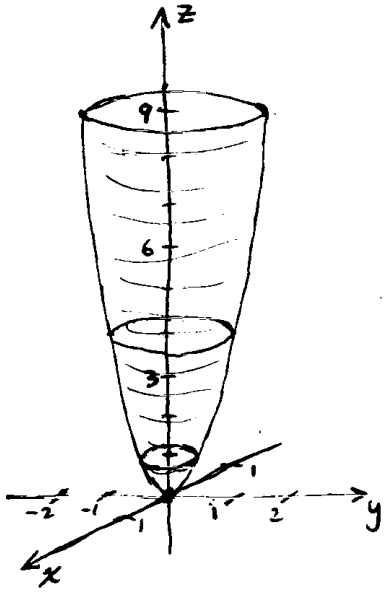
$$f(x,y) = 4x^2 + 4y^2$$

a) Sketch some level curves and the graph of f.
(Extra credit: What is the name of this shape?)

The level curve at $f = c$ is $4x^2 + 4y^2 = c$ or $x^2 + y^2 = \left(\frac{\sqrt{c}}{2}\right)^2$ which is a circle of radius $\frac{\sqrt{c}}{2}$:

| c | $\sqrt{c}/2$ |
|---|---|
| 0 | 0 |
| 1 | $\frac{1}{2}$ |
| 4 | 1 |
| 9 | $\frac{3}{2}$ |




(8 pts)

a Paraboloid

(+2 pts Ex. Cred)

b) Do you think f is continuous? Why, or why not? (2 pts)
(You don't have to prove your answer.)
Yes. There are no "breaks" in the graph. (In fact, f is a polynomial in x & y, and polynomials are always continuous.)

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3) If $f(x,y,z) = x \sin yz + y \cos xz$, calculate the partial derivatives $\frac{\partial f}{\partial x}$, $\frac{\partial f}{\partial y}$, $\frac{\partial f}{\partial z}$.

$$\frac{\partial f}{\partial x} = \sin yz - yz \sin xz$$

$$\frac{\partial f}{\partial y} = xz \cos yz + \cos xz$$

(10 pts)

$$\frac{\partial f}{\partial z} = xy \cos yz - xy \sin xz$$