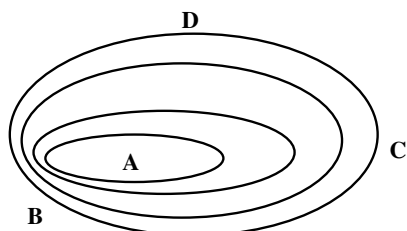


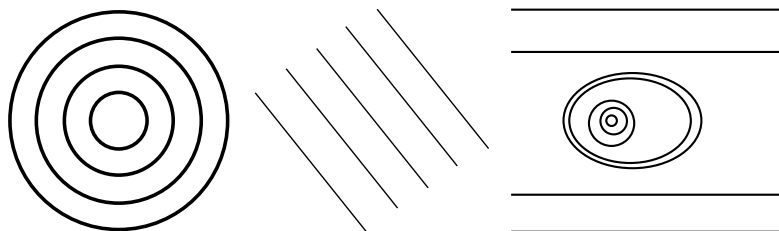
Merit Worksheet 11 - Math 242, Fall 2005

1. The diagram shows the level curves of a function.



Which path will result in the greatest change in altitude? Which path is the steepest?

- (a) From A to B;
 - (b) From A to C;
 - (c) From A to D;
 - (d) All the changes in altitude are about the same/ All the paths are the same steepness.
2. Can you think of two (or more) surfaces which have the following as their level curves?



3. Sketch some typical level curves of the function $f(x, y) = y - x^2$.
4. Describe the level surfaces of the function $f(x, y, z) = x^2 + y^2 - z$.
5. Let

$$f(x, y) = \frac{xy}{x^2 + y^2}.$$

Show that $\lim_{t \rightarrow 0} f(t, 0)$ and $\lim_{t \rightarrow 0} f(0, t)$ exist and are equal.

Show that $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does **not** exist.

6. Show that the limit below does exist. Hint: Consider a change of variables. There are also other ways of doing this . . .

$$\lim_{(x,y,z) \rightarrow (0,0,0)} \frac{xyz}{x^2 + y^2 + z^2}$$

7. Consider $f(x, y) = \frac{2x^2y}{x^4+y^2}$. Show that the limit of the function is 0 as you approach $(0, 0)$ along any straight line through the origin.

What is the limit along the parabola $y = x^2$?

What is $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$

Pre-flight for next time

Practice Exam / Exam Review Monday evening, 6-8 pm, 147 Altgeld. Take the exam for an hour and then I will work through it on the blackboard.