Name _____

Homework 1
Sections 12.1 & 12.2

1. (2ea) Consider the function $f(x, y) = x^2 - 3y + 2$. Sketch the cross-section of $f(x, y)$ with

   (a) $x = 2$

   (b) $y = -1$

2. (5) Consider the (somewhat strange) function $V(w)$ which returns the number of unique vowels (a, e, i, o, u only) in the English word w.
   [For example $V(vector) = 2$, while $V(banana) = 1$].

   (a) What is $V(calculus)$? $V(brachiosaurus)$?

   (b) Describe (in words) the zeros of the function V, and give one example.

   (c) What is the range of V?

3. (6) Consider the sphere $S : (x-1)^2 + (y+2)^2 + (z-3)^2 = 16$.

   (a) Find an equation for the circle where S intersects the xz-plane.

   (b) Let P be the horizontal plane which passes through $(4, 5, 2)$. Find the equation of the circle where P intersects S

   (c) Find the point(s) where S intersects the x-axis.

4. (5) Determine an equation for the intersection of the pairs of surfaces given below. Describe each intersection in words.

   (a) $z = \sqrt{16 - x^2 - y^2}$ and $z = \sqrt{x^2 + y^2}$

   (b) $z = \sqrt{20 - x^2 - y^2}$ and $z + 8 = x^2 + y^2$