Math 2130 Homework 1: 12.1-12.5

Complete the following exercises on separate sheets of paper. Be sure to read over the presentability guidelines (on the 2130 webpage) first.

1. How are the $xz$ plane and $x$ axis oriented relative to each other? How are the $xz$ plane and $y$ axis oriented relative to each other?
2. How far is the point $(1, 2, 3)$ from the $xz$ plane? From the point $(3, 2, 1)$?
3. Construct a table for the function $f(x, y) = x^y$ for $x = 1, 2, 3$ and $y = 1, 2, 3$.
4. What point do these graphs have in common?
   - (a) $f(x, y) = 9$
   - (b) $g(x, y) = (x + y)^2$
   - (c) $h(x, y) = 3^x$

5. Write out the order that these functions occur in each row of the following table:
   
   $A(x, y) = -x^2 - y^2$  $B(x, y) = x - y$  $C(x, y) = \sin(\pi(x^2 + y^2))$  $D(x, y) = -x^3$  $E(x, y) = -y^3$

6. For the function $f(x, y) = x^3 - y$, describe the intersection of its graph with:
   - (a) The $xz$ plane
   - (b) The $xy$ plane
   - (c) The plane $y = 1$

7. Find an equation of the plane through the points $(0, 0, 0), (0, 1, 1), (1, 2, 1)$.

8. What shapes do the level surfaces of $f(x, y, z) = x^2 + y^2 - z^2$ look like?