Name: _____

MAC 2313 — First Day Project

General Questions

1. Write the full names of every person in your group. Be sure you can pronounce them all if asked.

2. (a) Fill in the blank:
   If my instructor wasn't a mathematician, he'd be _____.

   (b) Your instructor likes each of the following bands/artists:

   The Smashing Pumpkins, Radiohead, Kanye West, Pantera, Elton John.

   Rank them based on how popular *you think* they are to your instructor.

   Most Popular:
   Second:
   Third:
   Fourth:
   Least Popular:

3. (a) List (at least) one cool thing you did over the break.

   (b) List (at least) one cool thing you *learned* over the break that you didn't know before.

4. Was math invented or discovered? Justify your answer.

5. What's your favorite number? Favorite math concept? Favorite science concept?

6. What do you want to be *when you grow up*?

7. Who's going to win the college football national championship?

Math Questions

8. In **one word**: What single concept differentiates calculus from algebra?

9. In your own words, define each of the following math terms. *If you don't know, that's okay! We're going to learn these things in this class!*

   (a) Dimension.

   (b) Vector.

   (c) Line.

   (d) Plane.

   (e) Parametric Equation/Curve.

10. Let $\mathbb{R}^2$ denote the two-dimensional xy-plane and let $\mathbb{R}^3$ denote the extension of $\mathbb{R}^2$ which adds a z-direction corresponding to "height".

    (a) Write the equation of the unit circle (having origin $O = (0, 0)$ and radius $r = 1$) in $\mathbb{R}^2$.

    (b) What geometric figure does the equation from part (a) correspond to in $\mathbb{R}^3$?

    (c) In $\mathbb{R}^3$, there are two additional "coordinate planes" in addition to the xy-plane (where $z = 0$): The yz-plane (where $x = 0$) and the xz-plane (where $y = 0$).

    Question: How many equations are needed to describe a circle in the xy-plane having origin $(x, y, z) = (0, 0, 0)$ and $r = 1$? What is/are it/they?

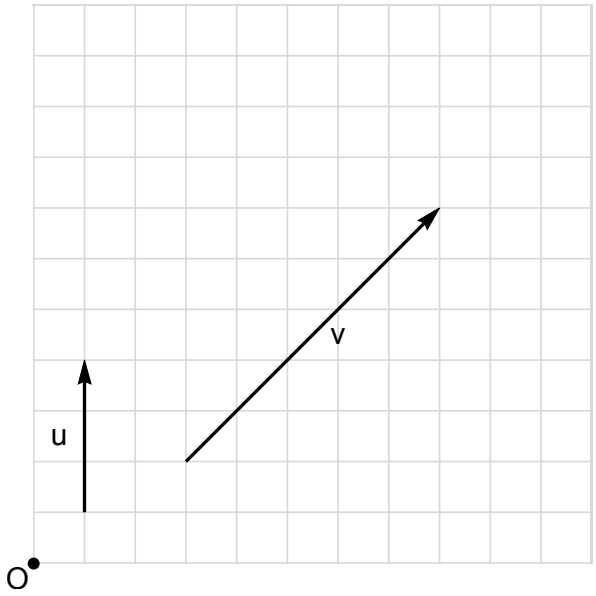
11. (a) Describe the graph of the function $y = x$ in $\mathbb{R}^2$. How about $y = x^2$ in $\mathbb{R}^2$?

    (b) Describe the graph of the function $y = x$ in $\mathbb{R}^2$. How about $y = x^2$ in $\mathbb{R}^3$.

12. Describe in words the region in $\mathbb{R}^2$ represented by the inequality $x^2 + y^2 \leq 9$. What about in $\mathbb{R}^3$?

13. What is the difference between the point $(1, 2)$ and the vector $\langle 1, 2 \rangle$ in $\mathbb{R}^2$?

14. (a) Let $\boldsymbol{u}$ and $\boldsymbol{v}$ be the vectors shown in the below figure. Draw (and clearly label) the vectors (i) $\boldsymbol{u} + \boldsymbol{v}$, (ii) $3\boldsymbol{u}$, and (iii) $\boldsymbol{v}/2$.



(b) What are the lengths of $\boldsymbol{u}$ and $\boldsymbol{v}$?

(c) Let $|\boldsymbol{w}|$ denote the length of an arbitrary vector $\boldsymbol{w}$. Is it true that $|\boldsymbol{u}| + |\boldsymbol{v}| = |\boldsymbol{u} + \boldsymbol{v}|$?

(d) Write the coordinates of the *terminal points* (i.e. the points in $\mathbb{R}^2$ where the arrowheads are located) for the translates of the vectors $\boldsymbol{u}$ and $\boldsymbol{v}$ which start at the origin O.

(e) Let $\boldsymbol{w} = \langle 5, 11 \rangle$. Show by means of a sketch that there are *scalars* (i.e. real numbers) s and t such that $\boldsymbol{w} = s\boldsymbol{u} + t\boldsymbol{v}$.

(f) Use part (d) to find the scalars s and t mentioned in part (e).