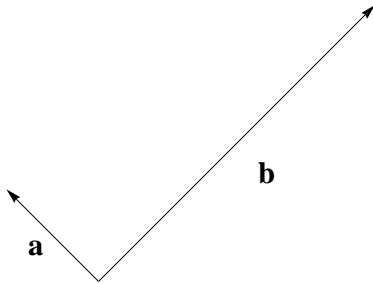


## Math 53 Discussion

**Practice Problems:** Vectors, vector addition, dot product, angles between vectors

1) Describe and sketch the surface  $y^2 + z^2 = 16$ .

2) Draw  $\vec{a} + \vec{b}$  and  $\vec{a} - \vec{b}$ .



3) Find a vector in the direction of  $\langle -2, 4, 2 \rangle$  and of length 6.

4) If  $\vec{v}$  lies in the first quadrant and makes an angle of  $\pi/3$  with the positive  $x$ -axis and  $|\vec{v}| = 4$ , find  $\vec{v}$  in component form.

5) Prove that the diagonals of a parallelogram intersect at their midpoints. (“Prove” just means explain why it’s true.)

6) Consider the three points  $A(1, 1, 1)$ ,  $B(1, 0, 1)$  and  $C(2, 0, 0)$ .

1. Find  $\vec{AB}$  and  $\vec{AC}$  in components.

2. Find the vector lengths  $|\vec{AB}|$  and  $|\vec{AC}|$ .

3. Find  $\vec{AB} \cdot \vec{AC}$ .

4. Find the angle between these two vectors using the dot product.