Warm Up: Unit analysis and vectors

Prof. Jordan C. Hanson

September 1, 2022

1 Memory Bank

1. $\vec{v} = v_x\hat{i} + v_y\hat{j}$ ... Definition of a vector in terms of $\hat{i}$ and $\hat{j}$ components (representing the x-direction and y-direction).
2. $\vec{v} + \vec{w} = (v_x + w_x)\hat{i} + (v_y + w_y)\hat{j}$ ... Vector addition: the $\hat{i}$-components add with each other, and the $\hat{j}$-components add with each other.
3. $|\vec{v}| = \sqrt{v_x^2 + v_y^2}$ ... The magnitude of the vector
4. $v_x = |\vec{v}|\cos\phi$, $v_y = |\vec{v}|\sin\phi$ ... The x and y-components of the vector

2 Chapter 1 - Estimation

1. Using whatever techniques seem appropriate, *estimate* the following:
   - A: The number of people in class.
   - B: The number of people on this floor of the SLC.
   - C: The number of people in the SLC.
   - D: The number of books in Wardman Library.

3 Chapter 2 - Algebra of Vectors

1. Calculate the following:
   - A: If we have a velocity $\vec{v} = -3\hat{i} + 3\hat{j}$ km/hr, what is the *magnitude* of the velocity?
   - B: If we have a velocity $\vec{v} = -3\hat{i} + 3\hat{j}$ km/hr, draw a picture of the velocity in a 2D coordinate system.
   - C: If we have a velocity $\vec{v} = -3\hat{i} + 3\hat{j}$ km/hr, what is the angle the velocity makes with the positive x-axis?