SYEN1210. Intro to Systems
Homework 5. Adding Vectors

In all problems, "bearing" refers to the angle relative to the positive x-axis. So, a vector whose direction is "bearing 100 degrees" means that it makes an angle of 100 degrees with respect to the positive x-axis, and will be in quadrant II.

The components of a vector, $\vec{v}$, are (v_x, v_y) .

Magnitude of $\vec{v}$ is $|\vec{v}| = \sqrt{v_x^2 + v_y^2}$.

Bearing of $\vec{v}$ is $\tan^{-1}\left(\dfrac{v_y}{v_x}\right)$ if the vector is in quadrant I or IV.

If the vector is in quadrant II or III, bearing of $\vec{v}$ is $180° + \tan^{-1}\left(\dfrac{v_y}{v_x}\right)$.

On all problems, draw a picture of all vectors, including the resultant of adding the vectors. Add the vectors by components and find the magnitude and direction using the formulas above.

1. A vector with magnitude 10 m and bearing 30 degrees is summed with a vector whose magnitude is 3 m and bearing 20 degrees. What is the magnitude and direction of the resultant?

2. A vector with magnitude 10 m and bearing 100 degrees is summed with a vector whose magnitude is 3 m and bearing 20 degrees. What is the magnitude and direction of the resultant?

3. A vector with magnitude 10 m and bearing 230 degrees is summed with a vector whose magnitude is 3 m and bearing 20 degrees. What is the magnitude and direction of the resultant?

4. A vector with magnitude 10 m and bearing 30 degrees is summed with a vector whose magnitude is 3 m and bearing 20 degrees and with a vector whose magnitude is 8m and bearing 60 degrees. What is the magnitude and direction of the resultant?