A man starts walking from home and walks 4 miles east, 2 miles southeast, 5 miles south, 4 miles southwest, and 2 miles east. How far has he walked? If he walked straight home, how far would he have to walk?

\[ 4 + 2 + 5 + 4 + 2 = 17 \text{ mi} \]

4: E \( \langle 4 \cos 0, 4 \sin 0 \rangle \)
    \( \langle 4, 0 \rangle \)

2: SE \( \langle 2 \cos 315, 2 \sin 315 \rangle \)
    \( \langle \sqrt{2}, -\sqrt{2} \rangle \)

5: S \( \langle 5 \cos 270, 5 \sin 270 \rangle \)
   \( \langle 0, -5 \rangle \)

4: SW \( \langle 4 \cos 225, 4 \sin 225 \rangle \)
    \( \langle -2\sqrt{2}, -2\sqrt{2} \rangle \)

\( <1.59, -1.243> \)

4: E \( \langle 2 \cos 0, 2 \sin 0 \rangle \)
   \( \langle 2, 0 \rangle \)

\( \langle 4 + \sqrt{2} + 0 + (-2\sqrt{2}) + 0 + (-\sqrt{2}) + 0 + (-5) + (-2\sqrt{2}) + 0 \rangle \)

\( <4.59, -9.243> \)

\[ m_{as} = \sqrt{(4.59)^2 + (-9.243)^2} \]
\[ = 10.32 \text{ mi} \]
Suppose a boat leaves port P headed in a direction of 70° with the automatic pilot set for 15 knots. On this particular day, there is 5 knot ocean current with a direction of 100°.

1. At what speed and in what direction will the boat actually travel during the first hour if does not adjust for the current.

\[ \vec{b} = \langle 15 \cos 70°, 15 \sin 70° \rangle \]

\[ \vec{c} = \langle 5 \cos 100°, 5 \sin 100° \rangle \]

\[ \vec{b} + \vec{c} = \langle 15 \cos 70° + 5 \cos 100°, 15 \sin 70° + 5 \sin 100° \rangle \]

\[ \langle 4.26, 19.02 \rangle \]

\[ |\vec{b} + \vec{c}| = \sqrt{(4.26)^2 + (19.02)^2} \]

\[ = 19.49 \text{ knots} \]
Three forces with magnitudes of 50 pounds, 75 pounds, 110 pounds act on an object at angles of $30^\circ$, $45^\circ$, and $150^\circ$ respectively with the positive x-axis. Find the direction and magnitude of the resultant of these forces.

\[
\begin{align*}
\vec{F}_1 &= \langle 50 \cos 30^\circ, 50 \sin 30^\circ \rangle \\
\vec{F}_2 &= \langle 75 \cos 45^\circ, 75 \sin 45^\circ \rangle \\
\vec{F}_3 &= \langle 110 \cos 150^\circ, 110 \sin 150^\circ \rangle
\end{align*}
\]

\[
\vec{F}_1 + \vec{F}_2 + \vec{F}_3 = \langle 1.071, 133.033 \rangle
\]

\[
\text{mag} = 133.037 \text{ lbs}
\]

\[
\tan^{-1} \left( \frac{133.033}{1.071} \right) = 84.539^\circ
\]