1. Two force vectors are applied to an object, \( \mathbf{F}_1 = (30, 45) \) and \( \mathbf{F}_2 = (45, 30) \), where the forces are measured in pounds.

   (a) Determine \( \|\mathbf{F}_1\| \) and \( \|\mathbf{F}_2\| \).

   (b) Find the resultant, or net, force vector \( \mathbf{F} \) acting on the object and determine \( \|\mathbf{F}\| \).

   (c) The force \( \mathbf{F} \) moves the object from the point \((1, 3)\) to \((4, 5)\), where the distance is measured in feet. Find the displacement vector \( \mathbf{D} \) of the object.

   (d) Determine the work done by the force \( \mathbf{F} \) in moving the object with displacement vector \( \mathbf{D} \).
2. A pilot wishes to fly with a bearing of $135^\circ$ and a speed of 300 mph. There is currently a wind blowing from the south at 50 mph. What direction (bearing) and speed should the pilot adopt to accomplish this? I.e., given $\mathbf{v}$ and $\mathbf{w}$, find $\mathbf{p}$.

3. Let $\mathbf{a} = \langle -3, 15 \rangle$ and $\mathbf{b} = \langle 12, -17 \rangle$. Determine each of the following.
   (a) The direction angle for $\mathbf{a}$ if $\mathbf{a}$ is in standard position.
   (b) $\mathbf{a} + \mathbf{b}$
   (c) $2\mathbf{a} - \mathbf{b}$
   (d) $\mathbf{a} \cdot \mathbf{b}$
   (e) The angle between $\mathbf{a}$ and $\mathbf{b}$

4. Are the vectors $\mathbf{a} = \langle 5, 6 \rangle$ and $\mathbf{b} = \langle 10, 13 \rangle$ parallel, perpendicular, or neither? Hint: to do this you should determine the angle between the vectors...