1. Given the vectors \( \mathbf{a} = \langle 1, -1 \rangle \) and \( \mathbf{b} = \langle 3, 1 \rangle \):
   
a.) Find a unit vector in the direction of \( \mathbf{a} - \mathbf{b} \)

b.) Find scalars \( s \) and \( t \) so that \( s \mathbf{a} + t \mathbf{b} = \langle 2, 4 \rangle \).

2. Two forces \( \mathbf{F}_1 \) and \( \mathbf{F}_2 \) are acting on an object at a point \( P \) as shown. Given that the magnitude of \( \mathbf{F}_1 \) is 5 pounds and the magnitude of \( \mathbf{F}_2 \) is 8 pounds, find the resultant force \( \mathbf{F} \) as well as it's magnitude and direction.
3. Suppose a wind is blowing from the direction N45°W at a speed of 55 km/hr. A pilot is steering a plane in the direction N60°E at an airspeed (speed in still air) of 226 km/hr. Find the true course (the direction of the resultant of the velocity vectors of the plane and the wind) and the ground speed (the magnitude of the resultant) of the plane.

4. Given the vectors \( \mathbf{a} = \langle -5, 1 \rangle \) and \( \mathbf{b} = \langle 3, 1 \rangle \), find the vector and scalar projections of \( \mathbf{b} \) onto \( \mathbf{a} \). Draw \( \mathbf{a} \), \( \mathbf{b} \) and the vector projection on the same axis. Be sure to label each vector.
5. A woman exerts a horizontal force of 25 pounds on a crate as she pushes it up a ramp that is 10 feet long and inclined at an angle of 20° above the horizontal. Find the work done on the box.

6. Given \( A(0, 1) \), \( B(2, 1) \) and \( C(5, 4) \), find the angle located at the point \( A \).

7. Find the distance from the point \((0, 3)\) to the line \( y = -2x \).