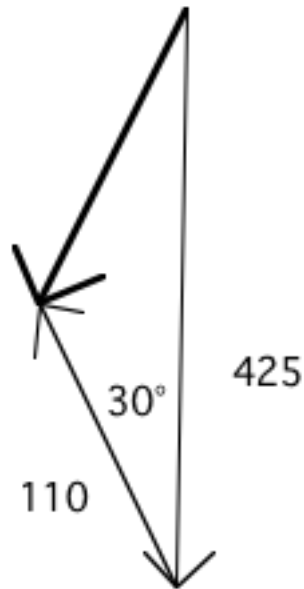


## Handout 15 Solutions

1) Angle between the wind and direction of boat:  $90^\circ - 20^\circ = 70^\circ$

So  $W = F \cdot D = 50000\text{lbs} \cdot 40\text{miles} \cdot 5280\text{ft} / \text{miles} [\cos 70^\circ] = 3,611\text{million ft-lbs}$

2)



$$\vec{v} = \langle 0, -425 \rangle + \langle -110 \sin 30^\circ, 110 \cos 30^\circ \rangle \approx \langle -55, -330 \rangle$$

$$\|\vec{v}\| \approx \sqrt{(-55)^2 + (-330)^2} \approx 335$$

$$\arctan\left(\frac{-330}{-55}\right) = 81^\circ + 180^\circ = 261^\circ$$

or  $189^\circ$  Using Aviation Directions

3)

$$\vec{d} = \langle 210, 0 \rangle + \langle 100 \cos 70^\circ, -100 \sin 70^\circ \rangle \approx \langle 224, -94 \rangle$$

$$\|\vec{d}\| \approx \sqrt{224^2 + (-94)^2} \approx 243$$

$$\arctan\left(\frac{94}{224}\right) = -23^\circ + 360^\circ = 337^\circ$$

or  $113^\circ$  Using Aviation Directions

4)

$$\arctan\left(\frac{4}{6}\right) \approx 33.4^\circ$$

$$300 \cos(33.4^\circ) \approx 250 \text{ lbs. Horizontal}$$

$$300 - 300 \sin(33.4^\circ) \approx 135 \text{ lbs. Vertical}$$

5)

$$\vec{v}_2 = 320 \cos(15^\circ) \approx 309 \text{ lbs.}$$

$$\vec{v}_3 = 320 \sin(15^\circ) \approx 83 \text{ lbs.}$$