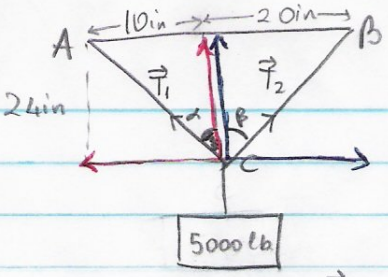
MATH 250 Homework 2 SOLUTIONS (selected problems)

1.1 #90.



$|AC| = \sqrt{100 + 576} = \sqrt{676}$

$|BC| = \sqrt{400 + 576} = \sqrt{976}$

1) Vertical component of $\vec{T}_1$ + Vertical Component of $\vec{T}_2$ = 5000

$$|\vec{T}_1| \cdot \cos\alpha + |\vec{T}_2| \cos\beta = 5000$$

$$|\vec{T}_1| \cdot \frac{24}{\sqrt{676}} + |\vec{T}_2| \frac{24}{\sqrt{976}} = 5000$$

2) Horizontal comp. of $\vec{T}_1$ + horizontal comp. of $\vec{T}_2$ = 0

$$|\vec{T}_1| \cdot \sin\alpha + |\vec{T}_2| \cdot \sin\beta = 0$$

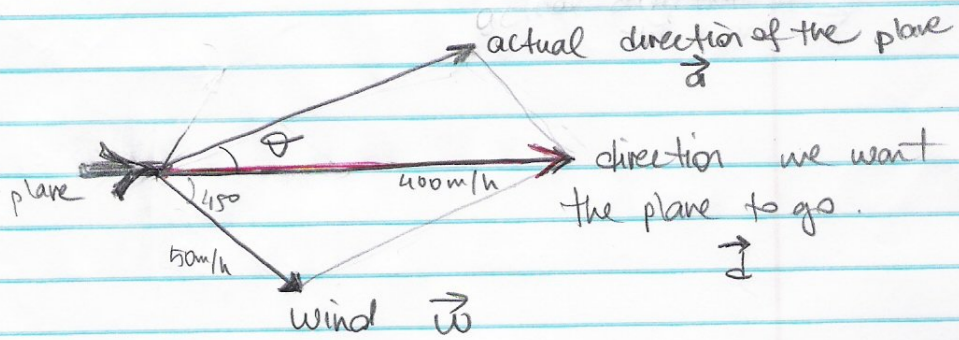
$$|\vec{T}_1| \frac{10}{\sqrt{676}} + |\vec{T}_2| \cdot \frac{20}{\sqrt{976}} = 0$$

Two linear equations in two unknowns.

Solve to get

$|\vec{T}_1| = 3611.2$ lb. and $|\vec{T}_2| = 2169.4$ lb.

1.1 #94



We want:

$$\vec{w} + \vec{a} = \vec{d}$$

So,

$$\vec{a} = \vec{d} - \vec{w}$$

Note that $\vec{d} = \langle 400, 0 \rangle$ and $\vec{w} = \left\langle \frac{50}{\sqrt{2}}, -\frac{50}{\sqrt{2}} \right\rangle$

So, $\vec{a} = \left\langle 400 - \frac{50}{\sqrt{2}}, \frac{50}{\sqrt{2}} \right\rangle$

$$\boxed{\vec{a} = \langle 364.65, 35.36 \rangle}$$

$|\vec{a}| = 366.35$ m/h. $\cos\theta = \frac{364.65}{366.35} = .995$

$\theta = \arccos(.995) \approx 5.5^\circ$