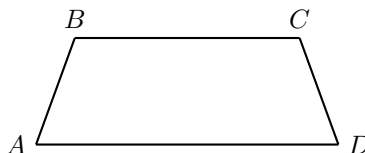


## MATH 7: ASSIGNMENT 10

### HOMEWORK

In this homework, you can use the calculator to compute sin and cos of various angles.

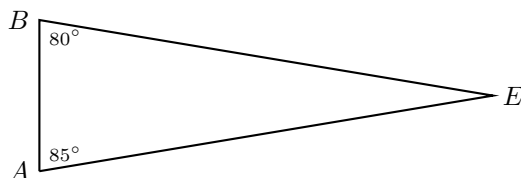
1. In the trapezoid shown to the right,  $AD = 5$  cm,  $AB = 2$  cm, and  $\angle A = \angle D = 70^\circ$ . Find the length  $BC$  and the diagonals.  
 [You can use:  $\sin(70^\circ) \approx 0.94$ ,  $\cos(70^\circ) \approx 0.34$ . ]



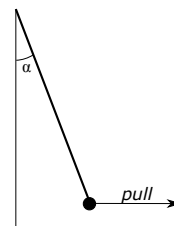
2. To determine the distance to the enemy gun (point  $E$  in the figure below), the army unit placed two observers (points  $A, B$  in the figure below) and asked each of them to measure the angles using a special instrument. The results of the measurements are shown below. If it is known that the distance between the observers is 400 meters, can you determine how far away from observer  $A$  is the enemy gun?

The figure is not to scale.

[This is indeed how the distances were determined say during WW I]



3. A heavy weight of mass  $m = 50\text{kg}$  is suspended on a rope. How hard should you pull it to the side to make the rope form the angle  $\alpha = 30^\circ$  with the vertical? What is the tension of the rope?



4. A body of mass  $m$  is placed on an inclined plane at angle  $\alpha$  with the horizontal line and held in place with a rope as shown in the figure. Physics tells us that there are 3 forces acting upon such a body: gravity  $\vec{G} = mg$ , where  $g \approx 9.8 \text{ m/sec}^2$ , rope pull  $\vec{T}$ , and the “reaction force”  $\vec{N}$  — coming from the inclined plane; this force is perpendicular to the plane. Find the rope tension. [Hint: introduce a coordinate system in which  $x$  axis goes along the inclined plane.]

