

MATH 1700: TEST 03 (100 POINTS)

NAME: _____

DIRECTIONS: Make sure your work is neat and complete and uses the techniques demonstrated in class.

1. Find all triangles which satisfy: $\alpha = 42^\circ$, $a = 17$, and $b = 23.5$.

Round your answers to two decimal places.

2. Scully and Mulder decide to hunt UFOs. One night, they position themselves 2 miles apart on an abandoned stretch of desert runway. An hour into their investigation, Mulder spies a UFO hovering over a spot on the runway directly between him and Scully. He records the angle of inclination from the ground to the craft to be 75° and radios Scully immediately to find the angle of inclination from her position to the craft is 50° . Find each of the quantities below, rounded to the nearest hundredth of a mile.

(a) How far is the UFO from Mulder's position? How far is the UFO from Scully's position?

(b) How high is the UFO above the ground?

3. Consider a triangle where $a = 7$, $b = 10$, and $c = 13$.

(a) Find the area of this triangle using Heron's Formula. Find an exact answer, then find a decimal approximation, rounded to two decimal places.

(b) Solve this triangle. Round your answers to two decimal places.

4. Let $\vec{v} = \langle 5, -10 \rangle$ and $\vec{w} = \langle -4, 3 \rangle$.

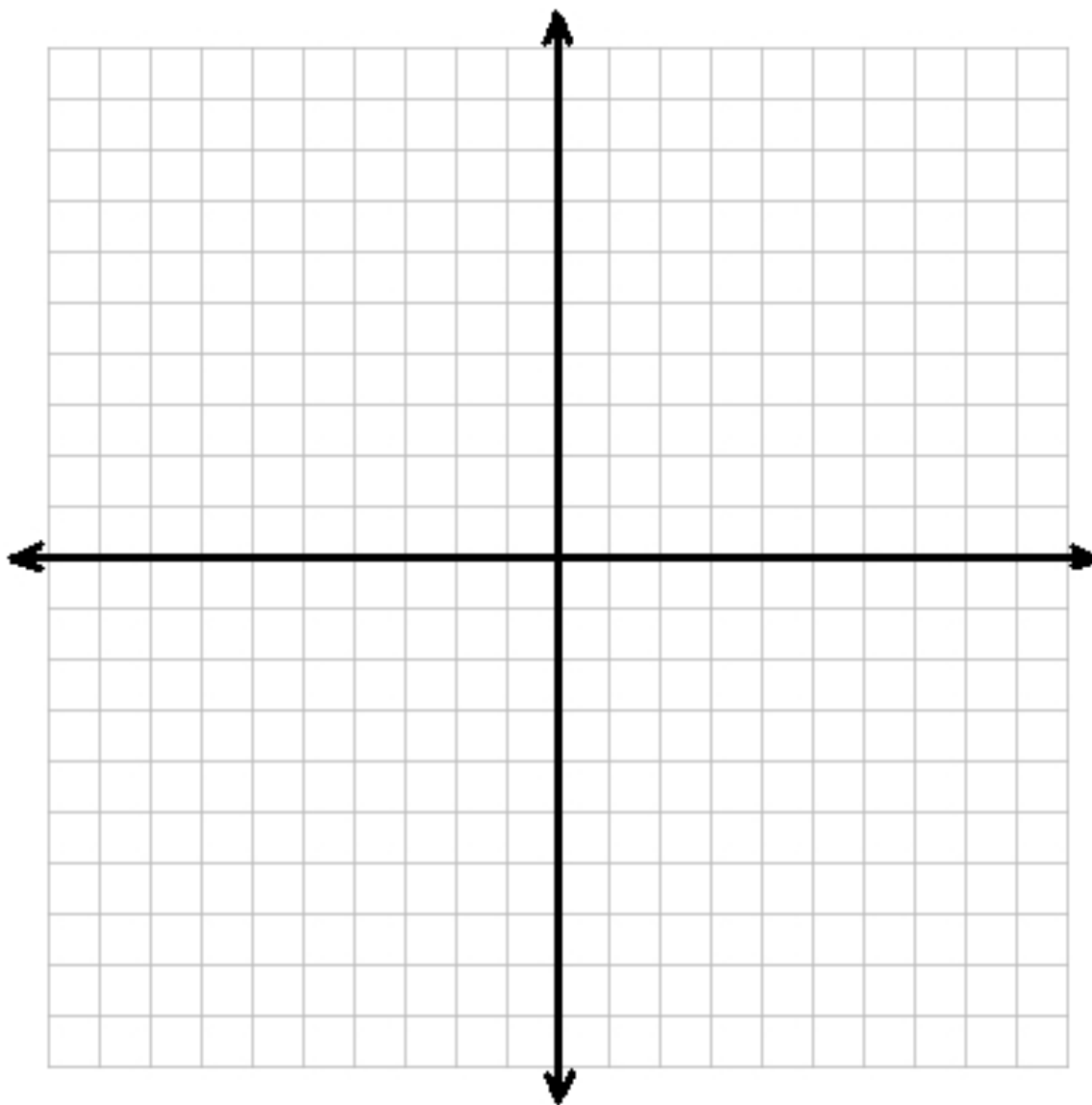
(a) Find $\vec{v} \cdot \vec{w}$, $\|\vec{v}\|$, and $\|\vec{w}\|$.

(b) Find the angle between \vec{v} and \vec{w} . (Round the angle to the nearest tenth of a degree.)

(c) Find and simplify $\vec{p} = \text{proj}_{\vec{w}} \vec{v}$.

(d) Find $\vec{q} = \vec{v} - \vec{p}$, and use the dot product to show $\vec{q} \perp \vec{w}$.

- (e) Graph \vec{v} and \vec{w} in standard position. Graph \vec{p} in standard position and \vec{q} so that the initial point of \vec{q} is the terminal point of \vec{p} to show geometrically $\vec{v} = \vec{p} + \vec{q}$.



5. Find the work done against gravity pushing a 100 pound object up a 30° incline for 10 feet. Round your answer to the nearest foot-pound.

6. The SS Minnow leaves Hanalei Bay on a course of N 37° W at a speed of 50 miles per hour. Answer each question below and round your numerical answers to two decimal places.
- (a) Assuming the SS Minnow travels on this heading for half an hour, find the component form of \vec{p} which would be the vector from the point of departure to the SS Minnow.
- (b) It turns that after half an hour, the Skipper determines he is 30 miles from the departure point and the bearing back to the port is S 40° E. Let \vec{r} be the vector from the departure port of the SS Minnow to its current position. Find the component form of \vec{r} .

(c) Let $\vec{d} = \vec{r} - \vec{p}$. Find $\|\vec{d}\|$. What are the units on $\|\vec{d}\|$?

(d) Assuming the only reason the SS Minnow is in a different location than expected is due to a water current, use part (c) to help you determine the speed of the water current.

HINT: Pay attention to units . . .

(e) Use part (c) to help you find the bearing of the water current.