

Name: \_\_\_\_\_ Section: \_\_\_\_\_

Exam1. Submit the script file on BlackBoard. Name it as you want.

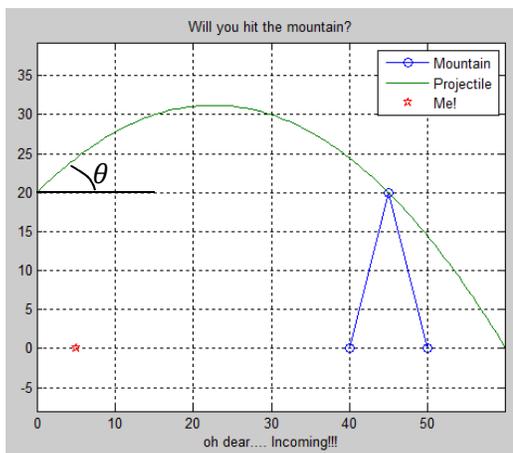
**NO QUESTIONS** WILL BE ANSWERED IF THEY PERTAIN TO WHY THE CODE DOES NOT WORK. NO QUESTIONS WILL BE ANSWERED REGARDING THE COVER SHEET EITHER. EVERYTHING IS WRITTEN HERE. **READ FULLY FIRST**. REFRAIN FROM RAISING YOUR HAND.

HOWEVER, PLEASE ASK FOR HELP IMMEDIATELY IF YOUR PC STARTS ACTING WEIRD!!!

**SAVE OFTEN** TO YOUR P:// DRIVE OR FLASHDRIVE!

All the units are correct, though a bit science-fiction.. no worries. Just go with it!

A projectile is shot at a mountain. We are to determine if the mountain gets hit graphically! Create a program that will plot the mountain **and** the projectile, to see if the mountain gets hit.



The x-coordinate (m) of the peak of the mountain, and its height (m) is known. The mountain is 5 m wide in both directions from its center. (see back for diagram)

The projectile is thrown from a known altitude  $y_0$  (m), at a known angle  $\theta$  (degrees) and velocity (m/s).

The x values for the projectile should end at the following point:

$$x_{\text{max}} = \frac{v_0 \cos(\theta)}{9.81} * (v_0 \sin(\theta) + \sqrt{(v_0 \sin(\theta))^2 + 19.62 y_0})$$

The path of the projectile is given by:

$$y(x) = y_0 + x * \tan(\theta) - 9.81x^2 / (2 * (v_0 \cos(\theta))^2)$$

Step1 (5pts):

Step2: Shown above. Step3: Equation also given above.

Step4: Assume values from Test Case#1.

Step5/Step6: Solve graphically. NO MATH (though it would be interesting!)

Step7a and 7b: place directly on the script file. There are no step 7c to show.

Requirements for the program itself:

(12pts) Hardcode a variable for each given.

(20pts) Define all vectors necessary to plot the projectile and the mountain (4 vectors)

(10pts) Plot correctly, using colors, markers and line specifications AS SHOWN in the videos. (+2 if you plot a star for the human! You are at 5 meters on the ground!)

(2pts) Immediately below your plot() command, write the command: `axis equal`; (Exactly like that!)

(15pts) Title, label the x axis (as shown) and legend the plot properly and fully

(7pts) – other random errors I should not even dream of!

**(5pts)** – Fill in the table. The units are science-fiction, but there is no need for any kind of conversion today.

Test case	Mountain Peak x-coordinate (m)	Mountain Height (m)	Projectile original height (m)	Projectile angle (degrees)	Projectile velocity (m/s)	Did mountain get hit? (or close to human?)
#1	45	20	20	45	21	
#2	45	20	20	45	16.2	
#3	50	89	65	5	1.375	

**Within script:**

- name/section/purpose of code **(3pts)**
- commands to clean up previous execution of MATLAB codes **(3pts)**
- comments (which is considered the algorithm 7a) **(5pts)**
- spacing of code **(5pts)**
- appropriate variable names (no single letters) **(5pts)**
- semi-colon hiding intermediate calculations **(3pts)**

