Assignment 4
Due: 2:00PM 9/27/18

Assume that a ship with position given by real Cartesian coordinates (x1,y1) using it's radar system sees an unknown target with real Cartesian coordinates (x2,y2). Write a Fortran program that prompts the user for the coordinates of the ship and target (in units of kilometers) and which calculates the range (distance), in kilometers, between the ship and the target and the bearing (the direction relative to true north), in degrees, of the target . The program should also tell the user what quadrant the target is in, i.e. northwest, northeast, southwest, or southeast, as well as if the target is exactly due north, south, east, or west of the ship. Finally, warn the user if the target and ship coordinates coincide.

USE NESTED IF CONSTRUCTS IN THIS PROGRAM. DO NOT USE ELSEIFS.

Hint: You can assume that the y-axis is the north-south axis. Make use of the **`atan`** function and classify all of the possible cases. It's OK to test for equality of floating point variables in this case to determine if the bearing is due north, south, east or west. Don't forget to convert radians to degrees! There is a helpful diagram on the next page. Make sure to put your user ID number in the filename (see instruction # 3 below).

Make sure that you code compiles (programs receive a zero if they are not able to be compiled on the Math SINC site machines) and make sure to test it by running it and observing that you get the correct answer! Submit only the source code file, i.e. the .f08 file containing the Fortran code, by uploading it into blackboard using the "attachments" button under the assignment. **Do not submit the executable file.**
If you submit the executable file you will receive zero credit

If you have any problems see the TAs or the instructor for help. Do not ask other students to help you debug your code. Submissions via email will not be accepted. **DO NOT WAIT UNTIL THE LAST MINUTE TO SUBMIT THE ASSIGNMENT! LATE ASSIGNMENTS WILL NOT BE ACCEPTED.**

Note:

1. **All Fortran programs must contain the implicit none statement or they will receive an automatic grade of zero.** There are no exceptions to this policy.

2. All programs should have a block of comment statements at the beginning of the code containing your name, **section number** (consult SOLAR if you are in doubt as to which section you are registered for), and a description of what the code does. Consult the lecture notes for examples.

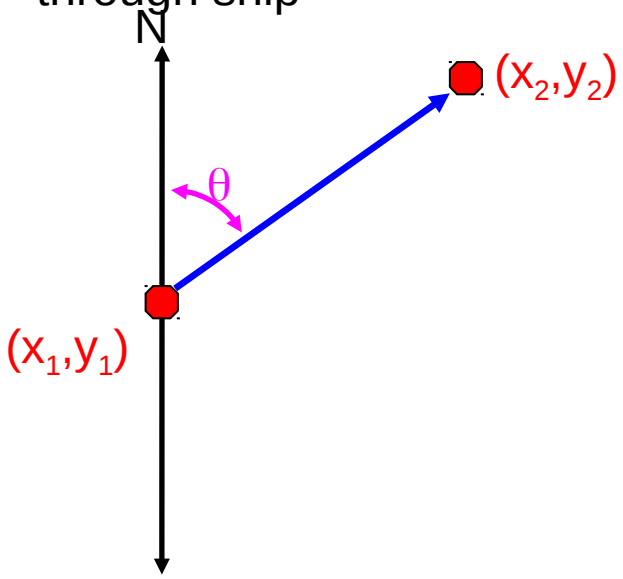
3. Your file should be named in the form of <*yourlastname*>_<*yourIDNumber*>_<*hw#*>.f08

4. All programs must compile using the gfortran compiler on the Mathlab machines. **Programs that do not compile will receive an automatic grade of zero.** There are no exceptions to this policy

5. Programs must be uploaded into the blackboard assignment page. Programs may not be submitted via email or hardcopy. Programs that are not uploaded into the blackboard assignment page will not be graded.

How the bearing is calculated

Case I:
target is east
of north-south line
through ship



Case II:
target is west
of north-south line
through ship