Purpose

The purpose of this assignment is to give you practice with writing more expressions for evaluation, formatting and using Math library functions.

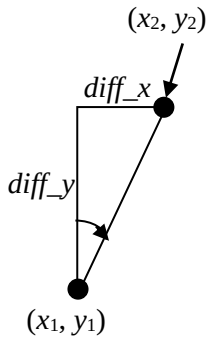
Problem

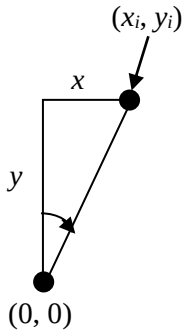
Write a program that prompts the user for the coordinates of two points (x_1, y_1) and (x_2, y_2) in meters, and prints
(1) The distance between them
(2) The bearing angle from the first point to the second point
(3) The angle (originating at the origin) swept from the first point to the second point.
Your program must print out 3 separate tables, each intended for audiences that have different requirements for precision, units, and space in which to print their tables. Here are the specifications for those tables in terms of units, characters available for each item, and number of digits required for each item:

	Units distance/angle	**Distance**	**Bearing**	**Sweep**
Table 1	Meters (m) / radians	5 characters, no decimal	6 chars, 3 digits	6 chars, 3 digits
Table 2	Meters (m) / degrees	10 characters, 5 digits	8 chars, 3 digits	6 chars, 2 digits
Table 3	Feet (ft) / degrees	9 characters, 2 digits	4 chars, no decimal	5 chars, 1 digit

Your program needs to use many functions. Here are the ones you need for this progam:

- sqrt(x) – returns the square root of the value of x
- pow(x, n) – returns the value of x raised to the power of n
- atan2(opp, adj) – returns the angle (in radians) of a triangle with sides of length opp and adj lengths

	Distance between two points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is given by: $d(P,Q) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
	<u>To calculate the bearing from the first point to the second:</u> For directional bearings, 0º is along the y-axis (instead of along the x-axis for math)—it's like the whole coordinate system is flipped around the diagonal line $y = x$. Therefore, *diff_x* is the "*opp*osite" side of the angle, and *diff_y* is the "*adj*acent" side. You can use the atan2 math function to find the bearing angle by providing the *diff_x* and *diff_y* explained above as arguments i.e. bearing_angle = atan2(diff_x, diff_y) *Note: The bearing angle computed using atan2 gives the angle in radians*

	<u>To calculate the sweep angle from the first point to the second:</u> Find the bearing angle from the **origin** (0, 0) to the second point, then *subtract* the bearing angle from the origin to the first point. The bearing angle from the origin to any point can be computed using atan2 function just the same way as above (since the origin is used as one point, it will just be the x and y values)

Input

The input will come from standard input, that is, from a user at the keyboard. Input prompts must be accurate. You will test input redirected from an input file. Sample input files are available in the public folder.

Two Pairs of (x, y) values – must be able to accept floating point numbers.

- Order of inputs: x1, y1, x2, y2
- (x1, y1) is the first point; (x2, y2) is the second point

Output

Output formatting as specified in the sample output files (one sample is shown below). Output will be sent to standard output (the screen).

```
Points are: (x1,y1)=(9220.30,1971.25), (x2,y2)=(2259.78,-2235.91)
+-------------------------------------------------------------------------------+
|       Distance (meters)|  Bearing Angle (radians)|    Sweep Angle (radians)|
+-------------------------------------------------------------------------------+
|                    8133|                   -2.114|                    0.991|
+-------------------------------------------------------------------------------+

+-------------------------------------------------------------------------------+
|       Distance (meters)|  Bearing Angle (degrees)|    Sweep Angle (degrees)|
+-------------------------------------------------------------------------------+
|              8133.20564|                -121.150|                     56.76|
+-------------------------------------------------------------------------------+

+-------------------------------------------------------------------------------+
|       Distance (meters)|  Bearing Angle (radians)|    Sweep Angle (radians)|
+-------------------------------------------------------------------------------+
|                26683.75|                    -121|                     56.8|
+-------------------------------------------------------------------------------+
```

Testing

On all your assignments, including this one, it is crucial that you test your program thoroughly. Programs that don't run receive a maximum of about 20 points. Do not add additional features that are not being asked for, since your program may not run against test inputs that I have created.

Submission

Submit this assignment with the code 1P:

`submit 1P` ***`name-of-your-file`***

Grade Key

Name, comments, input order, appropriate constants defined	**10**
Two pairs of (x,y) echoed back to the user	**6**
First table output accuracy	**22**
Second table output accuracy	**22**
Third table output accuracy	**22**
Output Formatting	**18**