Two Bodies

1. Write a program that will prompt the user to enter in the coordinates of two points in the Cartesian plane: (x_1, y_1) and (x_2, y_2), which amounts to four `float` values. To do this, use `cout` to print the prompt, `"Enter the coordinates x1, y1, x2, and y2:"` to the console and then use `cin` to allow the user to enter these into variables named `x1,y1,x2,y2` (you will need to write appropriate variable declarations first). Then confirm the entries were successful by reporting to the user what they entered. That is, on a new line, print `"You entered x1 = <the value>, y1 = <the value>, x2 = <the value>, y2 = <the value>.` We will interpret these values as the coordinates in units of meters of two points (x_1, y_1) and (x_2, y_2) in the coordinate plane.

2. Extend problem 1 by computing the slope of the line through (x_1, y_1) and (x_2, y_2) and store this in a variable of type `double` named `slope`. Compute this slope as a decimal and print this to the console. Check that the slope is defined, and if it's not, write `"A vertical line has no slope."`, or words to that effect, and bail out of the program with `return 0;`

3. Use the `atan2()` function to compute the angle the line connecting the two points makes with the horizontal. You may need to `#include<cmath>` to get access to this function. Express this angle in both radians and degrees, being sure to indicate which is which.

4. Compute the components u_x and u_y of the unit vector $\hat{u} = \langle u_x, u_y \rangle$ from (x_1, y_1) to (x_2, y_2). This is the vector of length 1 in that direction.

5. Prompt the user to enter the amount of mass (in kg) `m1` situated at (x_1, y_1) and the amount of mass (in kg) `m2` situated at (x_2, y_2). Then use the formula $F = \dfrac{G \cdot m_1 \cdot m_2}{r^2}$ to compute the force (in Newtons) of gravitational attraction between these two masses.

6. Finally, compute and report the vector of force from m_1 to m_2. This is done by multiplying a unit vector you computed in (4) by the scalar magnitude you computed in (5).

   A typical run might look like this:

```
Enter the coordinates x1, y1, x2, and y2: 0 0 1 1

You entered points (0, 0) and (1, 1)
The slope of the line through these points is 1
This line makes the angle 0.785398 radians with the horizontal.
This is equivalent to 45 degrees.
A unit vector parallel to this line is (0.707107, 0.707107).
Enter the masses of the two objects at these points (in kg):
m1 = 1e6
m2 = 2e6
The force of gravitational attraction between these masses is the vector (47.1929, 47.1929) Newtons.
```

   Include as a comment at the end of your code the results of a trial run or two like that shown above. Send your `.cpp` file to my email address with the format `<your initials>_linear.cpp` by Wednesday, February 12 at 9 am.