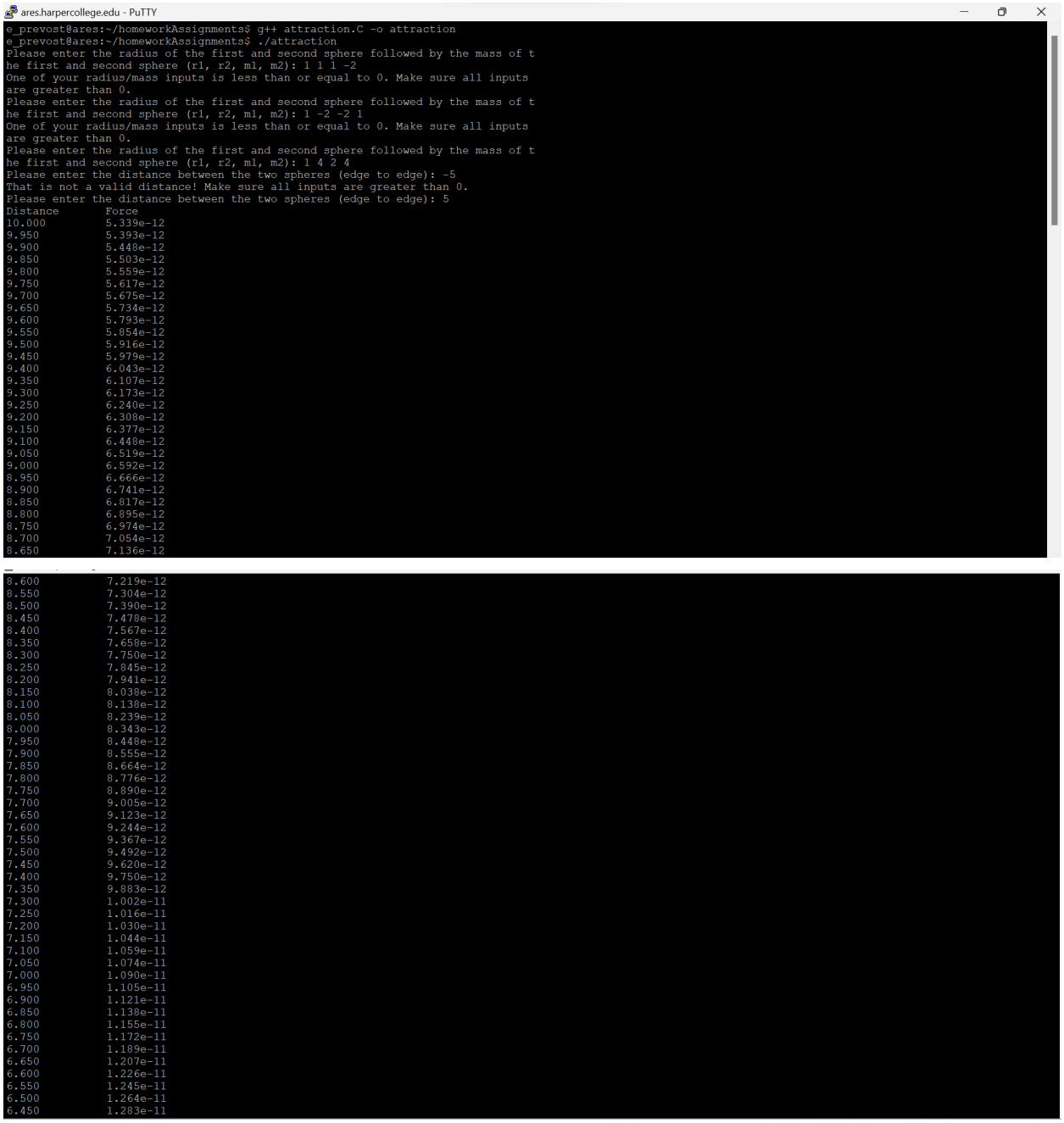
Attraction Assignment - Robert P.

Test Outputs:



```
ares.harpercollege.edu - PuTTY
e_prevost@ares:~/homeworkAssignments$ g++ attraction.C -o attraction
e_prevost@ares:~/homeworkAssignments$ ./attraction
Please enter the radius of the first and second sphere followed by the mass of t
he first and second sphere (r1, r2, m1, m2): 1 1 1 -2
One of your radius/mass inputs is less than or equal to 0. Make sure all inputs
are greater than 0.
Please enter the radius of the first and second sphere followed by the mass of t
he first and second sphere (r1, r2, m1, m2): 1 -2 -2 1
One of your radius/mass inputs is less than or equal to 0. Make sure all inputs
are greater than 0.
Please enter the radius of the first and second sphere followed by the mass of t
he first and second sphere (r1, r2, m1, m2): 1 4 2 4
Please enter the distance between the two spheres (edge to edge): -5
That is not a valid distance! Make sure all inputs are greater than 0.
Please enter the distance between the two spheres (edge to edge): 5
Distance        Force
10.000          5.339e-12
9.950           5.393e-12
9.900           5.448e-12
9.850           5.503e-12
9.800           5.559e-12
9.750           5.617e-12
9.700           5.675e-12
9.650           5.734e-12
9.600           5.793e-12
9.550           5.854e-12
9.500           5.916e-12
9.450           5.979e-12
9.400           6.043e-12
9.350           6.107e-12
9.300           6.173e-12
9.250           6.240e-12
9.200           6.308e-12
9.150           6.377e-12
9.100           6.448e-12
9.050           6.519e-12
9.000           6.592e-12
8.950           6.666e-12
8.900           6.741e-12
8.850           6.817e-12
8.800           6.895e-12
8.750           6.974e-12
8.700           7.054e-12
8.650           7.136e-12
```



```
8.600           7.219e-12
8.550           7.304e-12
8.500           7.390e-12
8.450           7.478e-12
8.400           7.567e-12
8.350           7.658e-12
8.300           7.750e-12
8.250           7.845e-12
8.200           7.941e-12
8.150           8.038e-12
8.100           8.138e-12
8.050           8.239e-12
8.000           8.343e-12
7.950           8.448e-12
7.900           8.555e-12
7.850           8.664e-12
7.800           8.776e-12
7.750           8.890e-12
7.700           9.005e-12
7.650           9.123e-12
7.600           9.244e-12
7.550           9.367e-12
7.500           9.492e-12
7.450           9.620e-12
7.400           9.750e-12
7.350           9.883e-12
7.300           1.002e-11
7.250           1.016e-11
7.200           1.030e-11
7.150           1.044e-11
7.100           1.059e-11
7.050           1.074e-11
7.000           1.090e-11
6.950           1.105e-11
6.900           1.121e-11
6.850           1.138e-11
6.800           1.155e-11
6.750           1.172e-11
6.700           1.189e-11
6.650           1.207e-11
6.600           1.226e-11
6.550           1.245e-11
6.500           1.264e-11
6.450           1.283e-11
```

```
6.450           1.283e-11
6.400           1.304e-11
6.350           1.324e-11
6.300           1.345e-11
6.250           1.367e-11
6.200           1.389e-11
6.150           1.412e-11
6.100           1.435e-11
6.050           1.459e-11
6.000           1.483e-11
5.950           1.508e-11
5.900           1.534e-11
5.850           1.560e-11
5.800           1.587e-11
5.750           1.615e-11
5.700           1.643e-11
5.650           1.673e-11
5.600           1.703e-11
5.550           1.733e-11
5.500           1.765e-11
5.450           1.798e-11
5.400           1.831e-11
5.350           1.865e-11
5.300           1.901e-11
5.250           1.937e-11
5.200           1.975e-11
5.150           2.013e-11
5.100           2.053e-11
5.050           2.094e-11
5.000           2.136e-11
e_prevost@ares:~/homeworkAssignments$
```

Source Code:

```cpp
/*
Code Made By Robert Prevost.
Last edited 9-30-2023.

Takes in input of radius and mass of two circles and distance between.
Outputs a table of 100 increments of the distance of two spheres and their force relative to eachother.

*/


#include <iostream>
#include <cmath>

using namespace std;

const long double G = 6.67408 * pow(10.0,-11.0);

int main()
{
        double radius1 = 0.0, radius2 = 0.0, mass1 = 0.0, mass2 = 0.0;
        cout<< "Please enter the radius of the first and second sphere followed by the mass of the first and second sphere (r1, r2, m1, m2): ";
        cin >> radius1 >> radius2 >> mass1 >> mass2;
        while(radius1 <= 0.0 || radius2 <= 0.0 || mass1 <= 0.0 || mass2 <= 0.0){
                cerr << "One of your radius/mass inputs is less than or equal to 0. Make sure all inputs are greater than 0." << endl;
                cout<< "Please enter the radius of the first and second sphere followed by the mass of the first and second sphere (r1, r2, m1, m2): ";
                cin >> radius1 >> radius2 >> mass1 >> mass2;
        }

        double x = 0.0;
        cout<< "Please enter the distance between the two spheres (edge to edge): ";
        cin >> x;

        while(x <= 0.0){
                cerr << "That is not a valid distance! Make sure all inputs are greater than 0."  << endl;
                cout<< "Please enter the distance between the two spheres (edge to edge): ";
                cin >> x;
        }
        cout.setf(ios::left);
        cout.width(15);
        cout<< "Distance";
        cout.width(15);
        cout<<"Force" <<endl;
        double xIncrement = (x/100);
        for(int i=0;i<=100;i++){
                cout.precision(3); //sets the output to be no more than 3 digits

                // F = (m1m2/d^2)G

                // d= x+r1+r2
                double d = x + radius1 + radius2;
                double F = ((mass1*mass2)/(pow(d,2.0)))*G;
                x -= xIncrement;
                cout.width(15);
                cout<< fixed << showpoint <<d;

                cout.width(15);
                cout << noshowpoint << scientific << F << endl;

        }
        return 0;

}
```

Source Code Text:

/*

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Takes in input of radius and mass of two circles and distance between.
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*/

```
#include <iostream>
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using namespace std;

const long double G = 6.67408 * pow(10.0,-11.0);

int main()
{
	double radius1 = 0.0, radius2 = 0.0, mass1 = 0.0, mass2 = 0.0;
	cout<< "Please enter the radius of the first and second sphere followed by the mass of the first and second sphere (r1, r2, m1, m2): ";
	cin >> radius1 >> radius2 >> mass1 >> mass2;
	while(radius1 <= 0.0 || radius2 <= 0.0 || mass1 <= 0.0 || mass2 <= 0.0){
		cerr << "One of your radius/mass inputs is less than or equal to 0. Make sure all inputs are greater than 0." << endl;
		cout<< "Please enter the radius of the first and second sphere followed by the mass of the first and second sphere (r1, r2, m1, m2): ";
		cin >> radius1 >> radius2 >> mass1 >> mass2;
	}

	double x = 0.0;
	cout<< "Please enter the distance between the two spheres (edge to edge): ";
	cin >> x;

	while(x <= 0.0){
		cerr << "That is not a valid distance! Make sure all inputs are greater than 0."  << endl;
		cout<< "Please enter the distance between the two spheres (edge to edge): ";
		cin >> x;
	}
	cout.setf(ios::left);
	cout.width(15);
	cout<< "Distance";
	cout.width(15);
	cout<<"Force" <<endl;
	double xIncrement = (x/100);
```

```
	for(int i=0;i<=100;i++){
		cout.precision(3); //sets the output to be no more than 3 digits

		// F = (m1m2/d^2)G
		// d= x+r1+r2
		double d = x + radius1 + radius2;
		double F = ((mass1*mass2)/(pow(d,2.0)))*G;
		x -= xIncrement;
		cout.width(15);
		cout<< fixed << showpoint <<d;

		cout.width(15);
		cout << noshowpoint << scientific << F << endl;

	}
	return 0;

}
```