

C++ Programming Assignment (#02)

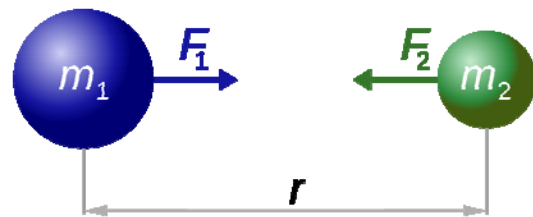
Date: Mar. 17, 2016

Instructor: Yoo, Younghwan

Due date: Mar. 23, 2016

Programming Projects

1. The gravitational attractive force between two bodies with masses m_1 and m_2 separated by a distance r is given by the formula in the right figure, where G is the universal gravitational constant:



$$F_1 = F_2 = G \frac{m_1 \times m_2}{r^2}$$

$$G = 6.673 \times 10^{-8} \text{ cm}^3 / (\text{g} \cdot \text{sec}^2)$$

Write a function definition that takes arguments for the masses of two bodies and the distance between them and returns the gravitation force between them. Since you will use the previous formula, the gravitational force will be in dynes. One dyne equals a $\text{g} \cdot \text{cm} / \text{sec}^2$.

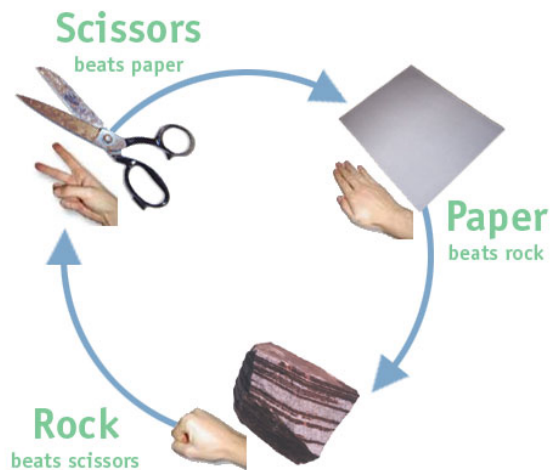
You should use a globally defined constant for the universal gravitational constant. Embed your function definition in a complete program that computes the gravitational force between two objects given suitable inputs. Your program should allow the user to repeat this calculation as often as the user wishes.

```
D:\My Documents\Lecture\Undergrad\C++\2016\prgAsmt\gravitation.exe
Mass of the 1st body <g> = 200
Mass of the 2nd body <g> = 100
Distance between the two bodies <cm> = 100
The gravitational force between them is 1.3346e-007.
Continue? <Y/n>y

Mass of the 1st body <g> = 320.5
Mass of the 2nd body <g> = 24.7
Distance between the two bodies <cm> = 55.5
The gravitational force between them is 1.71498e-007.
Continue? <Y/n>n

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Process exited after 89.09 seconds with return value 0
계속하려면 아무 키나 누르십시오 . . .
```

2. Write a program that emulates the game of *rock, scissors, and paper*. The computer chooses one of them randomly. Assuming that your initial choice is fixed over all games, your program counts the number of your winnings, ties, and losses, after playing 10, 100, and 1000 games.



```
D:\My Documents\Lecture\Undergrad\C++\2016\prgAsmt...
What's your choice? <0: ROCK, 1: SCISSORS, 2: PAPER> 0
Your choice is ROCK.

After 10 games:
Win = 4, Lost = 4, Tie = 2

After 100 games:
Win = 29, Lost = 37, Tie = 34

After 1000 games:
Win = 319, Lost = 357, Tie = 324
```

```
D:\My Documents\Lecture\Undergrad\C++\2016\prgAsmt...
What's your choice? <0: ROCK, 1: SCISSORS, 2: PAPER> 1
Your choice is SCISSORS.

After 10 games:
Win = 4, Lost = 2, Tie = 4

After 100 games:
Win = 37, Lost = 34, Tie = 29

After 1000 games:
Win = 357, Lost = 324, Tie = 319
```

```
D:\My Documents\Lecture\Undergrad\C++\2016\prgAsmt...
What's your choice? <0: ROCK, 1: SCISSORS, 2: PAPER> 2
Your choice is PAPER.

After 10 games:
Win = 2, Lost = 4, Tie = 4

After 100 games:
Win = 34, Lost = 29, Tie = 37

After 1000 games:
Win = 324, Lost = 319, Tie = 357
```

```
D:\My Documents\Lecture\Undergrad\C++\2016\prgAsmt\rsp.exe
What's your choice? <0: ROCK, 1: SCISSORS, 2: PAPER> 3
Your choice is wrong.
Input your choice again <0: ROCK, 1: SCISSORS, 2: PAPER>: 4
Your choice is wrong.
Input your choice again <0: ROCK, 1: SCISSORS, 2: PAPER>: 5
Your choice is wrong.
Input your choice again <0: ROCK, 1: SCISSORS, 2: PAPER>: 10
Your choice is wrong.
Input your choice again <0: ROCK, 1: SCISSORS, 2: PAPER>: 2
Your choice is PAPER.

After 10 games:
Win = 2, Lost = 4, Tie = 4

After 100 games:
Win = 34, Lost = 29, Tie = 37
```