Lab Assignment 3:

Basic Python Programming: Selection and Control

Assignment （100 points）

Calculate the probability of getting at least one 6 when throwing two dice.

This question can be analyzed theoretically using probability theory. Define A as the event of getting 6 from one die and B as the event of getting 6 from the other die. The probability of getting at least one 6 is $P(A\cup B)=P(A)+P(B)-P(A\cap B)$, where symbols $\cup$ and $\cap$ are "or" and "and" operators, respectively. Considering that $P(A)=P(B)=1/6$ and $P(A\cap B)=1/36$, $P(A\cup B)=11/36$.

However, a much simpler and much more general alternative is to let a computer program "throw" two dice a large number of times and count how many times a 6 shows up. Such type of computer experiments, involving uncertain events, is often called Monte Carlo simulation.

You can conduct the Monte Carlo simulation as follows: Create a script that in a loop from 1 to *n* draws two uniform random numbers between 1 and 6 and counts how many times ***p*** a 6 shows up. Write out the estimated probability ***p/float(n)*** together with the exact result 11/36. Run the script a few times with different ***n*** values (preferably read from the command line) and determine from the experiments how large ***n*** must be to get *the first three decimals (0.306) of the probability* correct.

Hint: Use the random module to draw random uniformly distributed integers in a specified interval.

Bonus question (30 points)

Somebody suggests the following game. You pay 1 unit of money and are allowed to throw four dice. If the sum of the eyes on the dice is less than 9, you win 10 units of money, otherwise you lose your investment. Should you play this game? Write a program to run simulations to answer this question.