

## Lab 11/14

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Don't use array in following problems. Suppose `rand()` can generate data with uniform distribution from 0 to `RAND_MAX`.

1. (a) Generate 10 random integer numbers of which range is [12, 34)

Use % to complete this program.

(b) Print the value of `RAND_MAX`

(c) Generate 10 random integer numbers of which range is [12, 34)

Note that the distribution should be uniform. You cannot use method in problem 3.

(d) Generate 10 random numbers of which range is [1.2, 3.4) with accurate to the 4th decimal point, i.e. 0.0001.

Note that the distribution should be uniform. You cannot use method in problem 3.

```
1.2776 1.6791 1.6439 1.6039 3.0141 2.2839 2.9898 2.8541 3.0926 1.3930
```

(e) The range of N is [1.2, 3.4) with accurate to the 4th decimal point. Simulate the probability of  $N \geq 2.3$  by generate N 1e8 times.

N should be generate by 2 methods, one is uniform and another is not (ues %). Print both results and theoretical value.

```
Theoretical: 0.500000  
NonUniform : 0.335652  
Uniform     : 0.500070
```

2. (a) Print the result of the following statement:

```
rand () * (RAND_MAX + 1) + rand ();
```

(b) Write a program to generate 10 random integer numbers of which range is [0, 99999].

Note that the distribution should be uniform. You cannot use method in problem 3.

3. (a) Understand the following two methods of random number generation.

```
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

int main()
{
    int x;
    int RANGE = 10000;
    srand (time (NULL));
    //method (a)
    x = rand()%RANGE;
    printf("x=%d\n",x);

    //method (b)
    int RAND_INV_RANGE=((int) ((RAND_MAX + 1) / (RANGE)));
    do {
        x = rand();
    } while (x >= RANGE * RAND_INV_RANGE);
    x /= RAND_INV_RANGE;
    printf("x=%d",x);

    return 0;
}
```

(b) Write a program to randomly generate 10 random real numbers of which range is  $[0, 1)$  with accurate to the fifth decimal point, i.e. 0.00001. **Please use method (b) in part (a) to solve this problem.**