1. Consider the following integral:

$$A = \int_{0}^{1} e^{x} dx = e - 1$$

Write a program that computes A using the Monte Carlo method. Use the result to compute e (now e = A + 1). Analyze the accuracy of your result as a function of the number of generated random numbers, and compare it with the accuracy obtained if the integral is computed using a trapezoid method.

2. Write a cryptographic program that works similarly to my crypto program:

   - Prompt the user to enter a secret key and use it to compute the seed of a random number generator

   - Prompt the user to give the names of an input file and the output coded/decoded file

   - Create the sequence of random bytes from a random number generator with the seed obtained from user's secret key.

   - Perform the coding of bit x using a random bit r as follows: $x \oplus = r$

   - Since $\forall r \in \{0,1\}, \quad r \oplus r = 0,$ perform decoding using the same sequence of random bytes and the same operation $x \oplus = r$. Decoding is based on the operation $x \oplus r \oplus r = x \oplus (r \oplus r) = x \oplus 0 = x$

3. Bank clients are filed using records

```
struct client
{   int account;
    char name[20];
    double balance;
} ;
```

Write a program that stores 10 customers in a relative file. The program then prompts the user to enter the account number, directly accesses the selected customer, and modifies the balance by adding the interest of 5%. You must operate directly on the original relative file without using auxiliary files.