Homework 2:

1. **Suppose the money for a bet is** $50.

Prizes	Rules	Money You Win
First prize	Match all numbers	100000000
Second Prize	Match 5 numbers	2000000
Third Prize	Match 4 numbers	50000
Fourth Prize	Match 3 numbers	500

   (a) Please write a function with the following inputs and outputs:

   Inputs: the money invested and the numbers chosen.

   Outputs: the final amount of money and the numbers of different prizes.

   (b) Suppose you have invested 5000000 dollars and always choose the numbers $1, 3, 5, 45, 47, 49$. Use the function in (a) to obtain the results.

2. The sequence is defined as follows:
$$x_0 = a, x_1 = b, x_{n+2} = x_{n+1} + 2x_n, n = 0, 1, 2, \cdots$$
   Please write a function with:

   input arguments: $a \; and \; b$

   output: x_{1000} and the first n such that $x_n > 10^7$.

   Test your function by setting $a = 0, b = 1$.

3. Please write a program to plot the density functions of $N(0, 1), N(1, 2), N(2, 9)$ whose domain within $[-10, 10]$ with the following requirements:
   (a) X-label is "x" while Y-label is "Density Functions".
   (b) The title of this plot is "Normal Distributions".
   (c) Use three different kinds of point types for the three functions.
   (d) Use three different kinds of lines types for the three functions.
   (e) The legend associated with the three density functions.

4. Given that Z is a standard normal random variable, and $Y \sim Binomial(7, 0.2)$ is a binomial random variable. Please do the following:
   (a) Compute $z_{0.03}$.
   (b) Compute $P(Y = 5)..$
   (c) Generate a sample of 1000 data from a chi-square distribution with the degree of freedom equal to 5.
(Help --> Online Manuals --> Guide to Statistics Volume 1 --> Chapter 3, Table 3.1)