

1. User Input and Replace String Template “Hello <<UserName>>, How are you?”

- a. I/P -> Take User Name as Input. Ensure UserName has min 3 char
- b. Logic -> Replace <<UserName>> with the proper name
- c. O/P -> Print the String with User Name

2. Simulate Stopwatch Program

- a. Desc -> Write a Stopwatch Program for measuring the time that elapses between the start and end clicks
- b. I/P -> Start the Stopwatch and End the Stopwatch
- c. Logic -> Measure the elapsed time between start and end
- d. O/P -> Print the elapsed time.

3. Leap Year

- a. I/P -> Year, ensure it is a 4 digit number.
- b. Logic -> Determine if it is a Leap Year.
- c. O/P -> Print the year is a Leap Year or not.

4. An Anagram Detection Example

- a. Desc -> One string is an anagram of another if the second is simply a rearrangement of the first. For example, 'heart' and 'earth' are anagrams...
- b. I/P -> Take 2 Strings as Input such abcd and dcba and Check for Anagrams
- c. O/P -> The Two Strings are Anagram or not....

5. Flip Coin and print percentage of Heads and Tails

- a. I/P -> The number of times to Flip Coin. Ensure it is positive integer .
- b. Logic -> Use Random Function to get value between 0 and 1. If < 0.5 then tails or heads
- c. O/P -> Percentage of Head vs Tails

6. Coupon Numbers

- a. Desc -> Given N distinct Coupon Numbers, how many random numbers do you need to generate distinct coupon number? This program simulates this random process.
- b. I/P -> N Distinct Coupon Number
- c. Logic -> repeatedly choose a random number and check whether it's a new one.
- d. O/P -> total random number needed to have all distinct numbers.
- e. Functions => Write Class Static Functions to generate random number and to process distinct coupons.

7. Power of 2

- a. Desc -> This program takes a command-line argument N and prints a table of the powers of 2 that are less than or equal to 2^N .
- b. I/P -> The Power Value N. Only works if $0 \leq N < 31$ since 2^{31} overflows an int
- c. Logic -> repeat until i equals N.
- d. O/P -> Print the year is a Leap Year or not.

8. Gambler

- a. Desc -> Simulates a gambler who start with \$stake and place fair \$1 bets until he/she goes broke (i.e. has no money) or reach \$goal. Keeps track of the number of times he/she wins and the number of bets he/she makes. Run the experiment N times, averages the results, and prints them out.
- b. I/P -> \$Stake, \$Goal and Number of times
- c. Logic -> Play till the gambler is broke or has won
- d. O/P -> Print Number of Wins and Percentage of Win and Loss.

9. Harmonic Number

a. Desc -> Prints the Nth harmonic number: $1/1 + 1/2 + \dots + 1/N$
(<http://users.encs.concordia.ca/~chvatal/notes/harmonic.html>).

b. I/P -> The Harmonic Value N. Ensure $N \neq 0$

c. Logic -> compute $1/1 + 1/2 + 1/3 + \dots + 1/N$

d. O/P -> Print the Nth Harmonic Value.

10. Sum of three Integer adds to ZERO

a. Desc -> A program with cubic running time. Read in N integers and counts the number of triples that sum to exactly 0.

b. I/P -> N number of integer, and N integer input array

c. Logic -> Find distinct triples (i, j, k) such that $a[i] + a[j] + a[k] = 0$

d. O/P -> One Output is number of distinct triplets as well as the second output is to print the distinct triplets.