Assuit University
Visual programming using C#

Faculty of Computers and Information
Sheet # 3, 2019

1. Write an expression that checks for given integer if its third digit (right-to-left) is 7. E. g. 1732 -> true .

2. Write a boolean expression for finding if the bit 3 (counting from 0) of a given integer is 1 or 0.

3. Write an expression that checks if given point (x, y) is within a circle K(O, 5).

4. Write an expression that checks if given positive integer number n (n ≤ 100) is prime. E.g. 37 is prime.

5. Write a boolean expression that returns if the bit at position p (counting from 0) in a given integer number v has value of 1. Example: v=5; p=1 -> false.

6. Write an expression that extracts from a given integer i the value of a given bit number b. Example: i=5; b=2 -> value=1.

7. Write a program that exchanges bits {p, p+1, …, p+k-1) with bits {q, q+1, …, q+k-1} of given 32-bit unsigned integer.

8. Write a program to print the first 100 members of the sequence of Fibonacci: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, …

9. Write a program to calculate the sum (with accuracy of 0.001): 1 + 1/2 - 1/3 + 1/4 - 1/5 + ...

10. Write a program that finds the biggest of three integers using nested `if` statements.

11. Write program that asks for a digit and depending on the input shows the name of that digit (in English) using a switch statement.

12. We are given 5 integer numbers. Write a program that checks if the sum of some subset of them is 0. Example: 3, -2, 1, 1, 8 -> 1+1-2=0.

13. Write a program that applies bonus scores to given scores in the range [1..9]. The program reads a digit as an input.If the digit is between 1 and 3, the program multiplies it by 10; if it is between 4 and 6, multiplies it by 100; if it is between 7 and 9, multiplies it by 1000. If it is zero or if the value is not a digit, the program must report an error. Use a switch statement and at the end print the calculated new value in the console.

14. Write a program that reads from the console a sequence of N integer numbers and returns the minimal and maximal of them.

15. Write a program that calculates N!/K! for given N and K (1 < K < N).

16. Write a program that calculates N!*K! / (K-N)! for given N and K (1 < N < K).

17. Write a program that calculates the greatest common divisor (GCD) of given two numbers. Use the Euclidean algorithm (find it in Internet).

18. Write a program that prints all possible cards from a standard deck of 52 cards (without jokers). The cards should be printed with their English names. Use nested for loops and switch-case.

19. Write a program that reads from the console a positive integer number N (N < 20) and outputs a matrix like the following:

Example:

```
1 2 3 4
2 3 4 5
3 5 6 7
4 5 6 7
```

20. Write a program that calculates for given N how many trailing zeros present at the end of the number N!.

Examples:

N = 10 -> N! = 3628800 -> 2

N = 20 -> N! = 2432902008176640000 -> 4

Does your program work for N = 50 000?

Hint: The trailing zeros in N! are equal to the number of its prime divisors of value 5. Think why!

21. A small dwarf stays at the bottom of the screen and can move left and right (by the arrows keys). A number of rocks of different sizes and forms constantly fall down and you need to avoid a crash. Rocks are the symbols ^, @, *, &, +, %, $, #, !, ., ;, - distributed with appropriate density. The dwarf is (O). Ensure a constant game speed by Thread.Sleep(150). Implement collision detection and scoring system.