Ministry of Higher Education and Scientific Research
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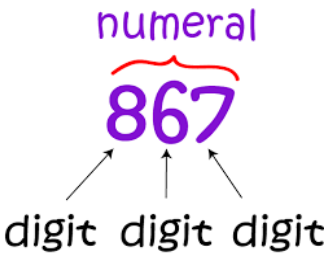
Faculty of Exact Sciences and Computer Science
Department of TC in Exact Sciences and Computer Science
BSc Computer Science 1st Semester – 2022/2023
Module: Algorithms and data structure 1

Tutorial 09: Loops 4

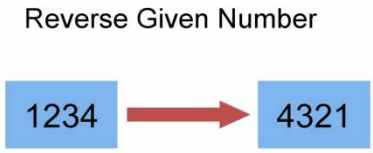
In this tutorial the students will learn bounded/unbounded loops.

"Success is not final; failure is not fatal: It is the courage to continue that counts."
Winston S. Churchill

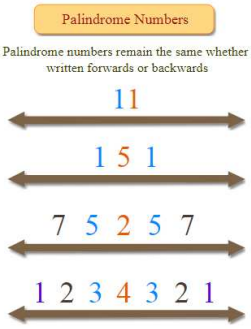
1. Write an algorithm to print multiplication table of any number.
2. Write an algorithm to count number of digits in a number.



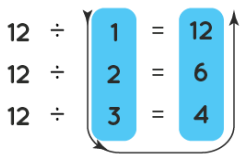
3. Write an algorithm to find first and last digit of a number.
4. Write an algorithm to find sum of first and last digit of a number.
5. Write an algorithm to swap first and last digits of a number.
6. Write an algorithm to calculate sum of digits of a number.
7. Write an algorithm to calculate product of digits of a number.
8. Write an algorithm to enter a number and print its reverse.



9. Write an algorithm to check whether a number is palindrome or not.

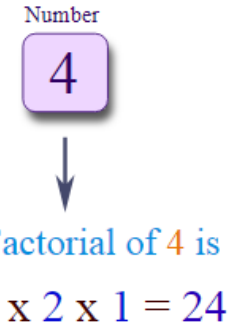


10. Write an algorithm to find all factors of a number.

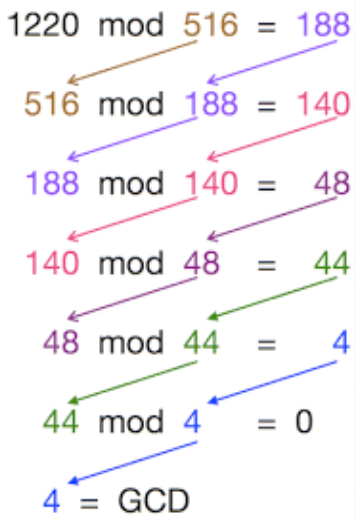


Factors of 12 = 1, 2, 3, 4, 6, 12

11. Write an algorithm to find frequency of each digit in a given integer.
12. Write an algorithm to enter a number and print it in words.
13. Write an algorithm to calculate factorial of a number.

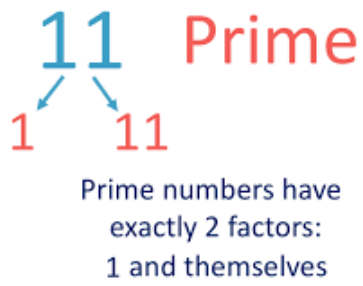


14. Write an algorithm to find GCD of two numbers.

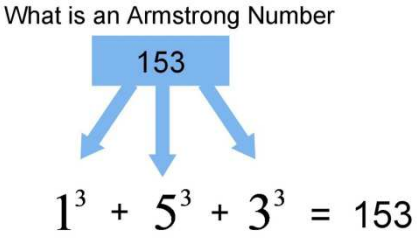


15. Write an algorithm to find LCM of two numbers.

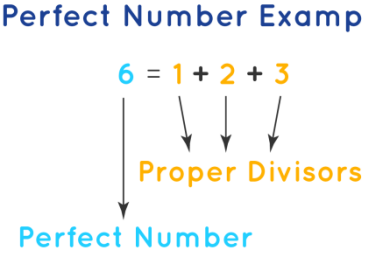
16. Write an algorithm to check whether a number is Prime number or not.



17. Write an algorithm to print all Prime numbers between 1 to n.
18. Write an algorithm to find sum of all prime numbers between 1 to n.
19. Write an algorithm to find all prime factors of a number.
20. Write an algorithm to check whether a number is Armstrong number or not.



21. Write an algorithm to print all Armstrong numbers between 1 to n.
22. Write an algorithm to check whether a number is Perfect number or not.



23. Write an algorithm to print all Perfect numbers between 1 to n.

24. Write an algorithm to check whether a number is Strong number or not.

Original number - 145

Sum = 1! + 4! + 5!
= 1 + 24 + 120
= 145

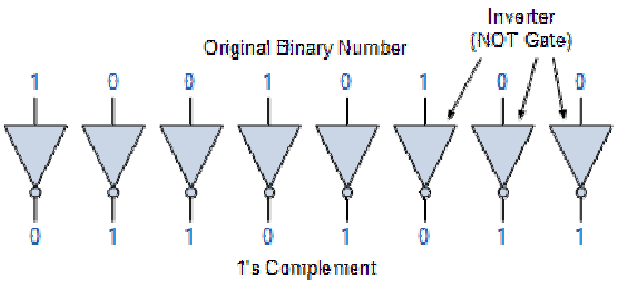
Sum == Original Number

Strong Number

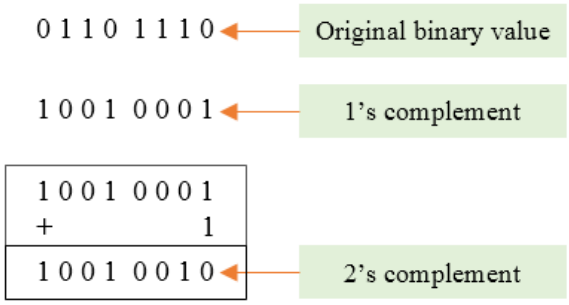
25. Write an algorithm to print all Strong numbers between 1 to n.
26. Write an algorithm to print Fibonacci series up to n terms.

$$F_0 = 0$$
$$F_1 = 1$$
$$F_n = F_{n-1} + F_{n-2}$$

27. Write an algorithm to convert Binary to Octal number system.
28. Write an algorithm to convert Binary to Decimal number system.
29. Write an algorithm to find one's complement of a binary number.



30. Write an algorithm to find two's complement of a binary number.



31. Write an algorithm to convert Binary to Hexadecimal number system.
32. Write an algorithm to convert Octal to Binary number system.
33. Write an algorithm to convert Octal to Decimal number system.
34. Write an algorithm to convert Octal to Hexadecimal number system.
35. Write an algorithm to convert Decimal to Binary number system.
36. Write an algorithm to convert Decimal to Octal number system.
37. Write an algorithm to convert Decimal to Hexadecimal number system.
38. Write an algorithm to convert Hexadecimal to Binary number system.
39. Write an algorithm to convert Hexadecimal to Octal number system.
40. Write an algorithm to convert Hexadecimal to Decimal number system.

Solve the following 9 by 9 Sudoku puzzle

1			4	8	9			6
7	3						4	
					1	2	9	5
		7	1	2		6		
5			7		3			8
		6		9	5	7		
9	1	4	6					
	2						3	7
8			5	1	2			4

41. Write an algorithm to calculate the sum of following series where n is input by user.

$$s_n = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \cdots + \frac{1}{n}$$

Find the words in the word puzzle

J S O L U T I S
S U N A R U U A
N E P T U N E T
S O N I E I S U
R C E V T R E R
A H T R A E S N
M M E R C U R Y

EARTH
JUPITER
MARS
MERCURY
NEPTUNE
SATURN
URANUS
VENUS

42. Write an algorithm to calculate the sum of following series where x and n are given by user.

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$$

$$= \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1}$$

43. Write an algorithm to calculate the sum of following series where x and n are given by user.

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots$$

$$= \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}.$$

Solve the following 9 by 9 Sudoku puzzle

			2	6		7		1
6	8			7			9	
1	9				4	5		
8	2		1				4	
		4	6		2	9		
	5				3		2	8
		9	3				7	4
	4			5			3	6
7		3		1	8			

White just moved their bishop to b4. How can you take advantage of this mistake?