



PROBLEM SET - 0

1. What is the Decimal equivalent of $(11110000101010101)_2$
2. What is the Hexadecimal equivalent of $(98899910)_{10}$
3. Convert the following numbers to base indicated and vice-versa (Cross-Verify)

$(1101)_2 \Rightarrow ()_8$
 $(1111\ 1111\ 1110)_2 \Rightarrow ()_{10}$
 $(221201)_3 \Rightarrow ()_{10}$
 $(76)_8 \Rightarrow ()_{10}$
 $(231)_8 \Rightarrow ()_2$
 $(0xF00)_{16} \Rightarrow ()_8$
 $(0xDACE)_{16} \Rightarrow ()_{12}$
 $(0x2B)_{16} \Rightarrow ()_8$

4. Convert the following numbers to the **base 10** :

$(3312)_8$
 $(168)_2$
 $(202103)_9$
 $(3132334)_{16}$
 $(0xF2)_8$

5. Convert the following base 10 numbers to the base indicated:

$$(5610)_{10} \Rightarrow ()_2$$

$$(5610)_{10} \Rightarrow ()_3$$

$$(5610)_{10} \Rightarrow ()_8$$

$$(5610)_{10} \Rightarrow ()_{12}$$

$$(5610)_{10} \Rightarrow ()_{16}$$

$$(22110)_{10} \Rightarrow ()_2$$

$$(22110)_{10} \Rightarrow ()_3$$

$$(22110)_{10} \Rightarrow ()_8$$

$$(22110)_{10} \Rightarrow ()_{12}$$

$$(22110)_{10} \Rightarrow ()_{16}$$

6. Convert the following **floating numbers**

1) $(34.34)_{10}$

2) $(125.125)_{10}$

3) $(10.16)_{10}$

to **binary, base 3, octal, and hexadecimal**. Any fractions that do not terminate should be truncated to 4 digits in the fractional part.

7. What is the **largest positive number** one can represent in a **12-bit 2's complement** code? Write your result in binary and decimal?

8. What are the 8-bit patterns used to represent each of the characters in the string "**CODE/THS 2019**"? (Only represent the characters between the quotation marks.)

***Note: There is space between **THS** and **2019**.*

9. Perform the following additions on **8-bit numbers**, generating an **8-bit result**. **Negative numbers** are represented using two's complement. For each addition, clearly indicate if unsigned and/or **signed overflow occurred or not**.

- 1111 1111 0101
0000 1100 1100

- 1101 0101 1010
1111 1110 1010

- 1111 1111 0100
1101 0111 1111

- 1111 1111 0011
0011 1001 1001

10. $(1101)_2 \times (101)_2$

11. $(1001)_2 \div (101)_2$

12. What is the biggest binary number you can write with 5 bits?

13. What is the biggest binary number you can write with n bits?

14. Which fractions recur infinitely in binary and which terminate?

15. In hex, **2BFC + 54A7 ??**

16. If a number has **k** digits in hex, how many digits (bits) does it have in **binary**?

17. Convert the binary number **1101101111110101** to hex ?

18. Convert the hex number **ABC7** to binary?
19. In hex, **AC74 - B3F**?
20. Convert the following binary fractions to ordinary fractions
- **0.1001**
 - **1.0011**
 - **1.1111**
21. The decimal expansion of **11/17 is 0.647**. Find the binary expansion of the fraction **11/17**.
22. The decimal expansion of **3/11 is 0.2727**. Find the **binary expansion** of the fraction **3/11**.
23. The decimal expansion of **11/17 is 0.647**. Find the **binary expansion** of the fraction **11/17**.
24. The decimal expansion of **3/11 is 0.2727**. Find the binary expansion of the **fraction 3/11**.
25. The following binary numbers are **4-bit 2's complement binary numbers**. Which of the following operations generate overflow? Justify your answers by translating the operands and results into decimal.
- a. 0011 + 1100**
 - b. 0111 + 1111**
 - c. 0111 + 1111**
 - d. 0110 + 0010**
26. What is the significance of the **127.0.0.1 address**?
27. How many **bits** are in **IPv4 IPv6**?

28. Convert this IP Address in Binary Dot Notation
11000000.10010000.00001010.00001010
into its equivalent decimal Dot Notation?
29. What is the range of IPv4 address ?
30. Explain the Classification of IP Addresses ?
31. Why are we running out of IPv4 Addresses?
32. Can a device have both IPv4 and IPv6 address simultaneously?
33. IPv4 classification is done on which octet of IPv4 address format ?
34. **Class E** IP Addresses are currently used for which purpose?
35. Which class does this ip address **224.255.255.1** belongs?
36. What are Private IP Addresses and What is their range ?
37. Given an IP Address can I differentiate between Public and Private IP Address?
38. Define Port? What does Port Number represents?
39. Port numbers used by HTTP, FTP, HTTPS, SMTP are ?
40. What is a web server and client ? Command used to start simple python HTTP server in Linux?
41. What is the difference between URI , URL, URN ?
42. What are Server side programming languages ? Name few server side programming languages ?

43. Can JavaScript be considered as a client side programming language ?
44. What does DNS server consists of and what is the importance of it ? Define Root Servers?
45. What is DNS spoofing ?
46. What are Status Codes in HTTP? What are HTTP Request Methods? HTTP Status Codes 200, 400 , 502 and 201 for ?
47. What is the role of Model , View and Controller in MVC architecture? Role of Client and Server in Client Server Architecture?
48. What is a Compiler, How is JavaScript code executed ? Using Compiler or interpreter?
49. What is a JIT (Just In Time compilers), what is their role in the modern day web Browsers?
50. What is the purpose of VPN ? How are VPN and Firewalls Related?

THE END