

School of Engineering and Computer Science

# **Mathematics Applied to Digital Engineering**

## **(Revision)**

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## 1 Exericces

## 2 Solutions

- ☞ **Exercise 1.** Add  $(110100111)_2$  and  $(1110101)_2$ .
- ☞ **Exercise 2.** Add  $(4712)_8$  and  $(1624)_8$ .
- ☞ **Exercise 3.** Subtract  $(232)_8$  from  $(417)_8$ .
- ☞ **Exercise 4.** Perform a hexadecimal addition of  $(B49C)_{16}$  and  $(4E2F)_{16}$ .
- ☞ **Exercise 5.** Perform the hexadecimal subtraction of  $(C92D)_{16}$  from  $(7F9E)_{16}$ .
- ☞ **Exercise 6.** Find the 10's-complement of 63918.
- ☞ **Exercise 7.** Find the 10's-complement of 28, 4592
- ☞ **Exercise 8.** Find the 10's-complement of 0, 5813.
- ☞ **Exercise 9.** Find the 9's-complement of 63918.
- ☞ **Exercise 10.** Find the 9's-complement of 28, 4187.
- ☞ **Exercise 11.** Find the 2's-complement of 1011, 11010000.

▶ Go to Solution

- ☞ **Exercise 12.** Find the **2**'s-complement of **1110001100000**
- ☞ **Exercise 13.** Find the **2**'s-complement of **0, 10001**.
- ☞ **Exercise 14.** Find the **1**'s-complement of **101000011**
- ☞ **Exercise 15.** Find the **1**'s-complement of **1011, 11010000**
- ☞ **Exercise 16.** Find the subtraction **(96258 – 43271)<sub>10</sub>** using the **10**'s-complement method.
- ☞ **Exercise 17.** Find the subtraction **(128722 – 439811)<sub>10</sub>** using the **10**'s-complement method.
- ☞ **Exercise 18.** Find the subtraction **(51346 – 06938)<sub>10</sub>** using the **9**'s-complement method.
- ☞ **Exercise 19.** Find the subtraction **(1011110 – 1001011)<sub>2</sub>** using the **1**'s-complement method.
- ☞ **Exercise 20.** Express **(+99)<sub>10</sub>** and **(-99)<sub>10</sub>** into signed magnitude binary form.
- ☞ **Exercise 21.** Express **(+45)<sub>10</sub>** and **(-45)<sub>10</sub>** into signed magnitude binary form.
- ☞ **Exercise 22.** Express the decimal number **(-61)** in **8-bit signed magnitude, 1**'s-complement and **2**'scomplement form. ▶ Go to Solution

☞ **Exercise 23.** Determine the value of base  $x$  if  $(211)_x = (152)_8$

☞ **Exercise 24.** The  $(r - 1)'s$  complement of base-6 numbers is called the 5's complement.

- Determine a procedure for obtaining the 5's complement of base-6 numbers.
- Obtain the 5's complement of  $(543210)_6$ .

☞ **Exercise 25.** Decode the following ASCII code:

- 1001010 1101111 1101000 1101110 0100000 1000100 1101111 1100101.
- 1010011 1110100 1100101 1110110 1100101 0100000 1001010 1101111 1100010 1110011.

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**Solution 1.** 1000011100

**Solution 2.** 13541

**Solution 3.** 165

**Solution 4.** 102CB

**Solution 5.** 498F

**Solution 6.** 36082

**Solution 7.** 71, 5408

**Solution 8.** 0, 4187

**Solution 9.** 36081

**Solution 10.** 71, 5812

**Solution 11.** 0100, 00110000

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Solution 12. 000110100000



Solution 13. 0,01111



Solution 14. 010111100



Solution 15. 0100,00101111



Solution 16.  $(52987)_{10}$



Solution 17.  $(-311089)_{10}$



Solution 18.  $(-52987)_{10}$



Solution 19.  $(0010011)_2$



Solution 20. 11100011



Solution 21. 10101101



Solution 22. 11000010 and 11000011



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**Solution 23.**

$$(211)_x = (152)_8 \iff 2x^2 + x + 1 = 8^2 + 5 \times 8 + 2 \iff 2x^2 + x - 105 = 0 \iff x = 7. \blacksquare$$

**Solution 24.** 012345 ■

**Solution 25.**

- a) John Doe
  - b) Steve Jobs
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A photograph of a beach scene. In the foreground, several thatched umbrellas are set up on a sandy area. Some small tables are visible under the umbrellas. To the right, a red flag flies from a pole. The background shows the ocean with some waves and a cloudy sky.

Thank you! Questions?