

EXERCISE N° 01: We give the following program

Program P1; var X:real; begin writeln('give a real value'); Readln(X); if X < 0 then X := - x
Writeln('This program displays As result: ', X); readln end.

- 1) Type this program while improving the readability of the code, then save it on removable media
- 2) Test this program using the values 1.5, -51, 62, -10.5? What does this program do?

EXERCISE N° 02: Complete the following table:

Decimal	Binary	Octal	Hexadecimal
(4067) ₁₀			
	(011101110) ₂		
		(7070) ₈	
			(D1A) ₁₆

EXERCISE N° 03: Convert the following fractional numbers into the corresponding system bases

- a) $(3.14579)_{10} = (\dots\dots\dots)_2$; $(175.435125)_{10} = (\dots\dots\dots)_8$
- b) $(1110,101)_2 = (\dots\dots\dots)_{10}$; $(257,35)_8 = (\dots\dots\dots)_{10}$; $(B03,A)_{16} = (\dots\dots\dots)_{10}$
- c) $(0.14)_8 = (\dots\dots\dots)_2$; $(11101.11101)_2 = (\dots\dots\dots)_8$
- d) $(B10A.1F)_{16} = (\dots\dots\dots)_2$; $(11.11101)_2 = (\dots\dots\dots)_{16}$

EXERCISE N° 04: Calculate the following operations

$(011101110)_2$	$(11101110)_2$	$(11111110)_2$	$(11100010)_2$	$(1110)_2$	$(10.01)_2$	$(1010001)_2$
+	-	+	-	×	×	÷
$(001111011)_2$	$(11101111)_2$	$(11111110)_2$	$(01111110)_2$	$(1011)_2$	$(111.11)_2$	$(11)_2$

EXERCISE N° 05:

- A) give the representation **in 8 bits** of the numbers $(-34)_{10}$, $(+97)_{10}$ in:
 - 1- Signed coding (signed binary).
 - 2- Two's complement.
- B) Same question for the numbers $(-112)_{10}$ and $(-256)_{10}$ coded on **16 bits**?
- C) Give the decimal representations of the following binary numbers coded in two's complement (**2's complement**).

1. (00000111) (coded on 1 byte)	
2. (111111111111001) (coded on two bytes)	
3. (11110110) (coded on one bytes)	

EXERCISE N° 06:

In memory, the following sequence 01101010 10010101 is given. Indicate the value of this memory in cases where this sequence is made up of:

- Two natural integers each coded on 8 bits.
- Two 8-bit signed relative integers.
- Two relative integers represented on 8 bits in 2's complement.

EXERCISE N° 07: What do the following programs display? Comment on the results?

1. **program** prog1; **begin** writeln(2 - 5 * 3 + 4 * (2 - 5) * (3 + 4) / 2 - (5 * 3 + 4)); **end**.
2. **program** prog2; **begin** writeln(12 + 3 * 12 div 3 + 11 div 3 div 2 + 11 mod 3 + 5/3); **end**.
3. **program** prog4; **begin** writeln(succ(succ(succ('p'))) + pred(pred(pred('w')))); **end**.

EXERCISE N° 08: What will be the values of variables A and B after running each of the following programs?

<pre>begin A ← 6 B ← (A + 3) * 2 A ← A + B + 4 B ← (B + 2) * 3 A ← B - A - 7 end</pre>	<pre>begin A ← 6 B ← 2 A ← A + B B ← A - B A ← A - B end</pre>	<pre>begin A ← 6 B ← 2 C ← B B ← A A ← C end</pre>
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EXERCISE N° 09: Write a program that exchanges the value of two variables. Example, if $a = 2$ and $b = 5$, the program will give $a = 5$ and $b = 2$.

EXERCISE N° 10: Write a program that receives two integers, then writes their sum and difference.

EXERCISE N° 11: Write the Cylinder program, which calculates and displays the volume of a cylinder after entering its radius R and its height H.

EXERCISE N° 12: Write a program that calculates and displays the absolute value of a real number x entered by the user (use the Abs(x) function).

EXERCISE N° 13: Rewrite the previous program without using the Abs function.

EXERCISE N° 14: Write a program that asks the user for two real numbers and then informs them if their product is negative or positive (we leave aside the case where the product is zero). Be careful, however: you must not calculate the product of the two numbers.

EXERCISE N° 15: Write a program that makes it possible to discern a mention for a student based on the average mark of their grades:

- "Very good" for an average mark between 16 and 20 ($16 \leq \text{average} \leq 20$).
- "Good" for an average mark between 14 and 16 ($14 \leq \text{average} < 16$).
- "Fairly good" for an average mark between 12 and 14 ($12 \leq \text{average} < 14$).
- "Fair" for an average mark between 10 and 12 ($10 \leq \text{average} < 12$).

EXERCISE N° 16: Write an algorithm that reads two real numbers and calculates and displays their sum if they are both positive or the product if they are both negative. Then translate this algorithm into a PASCAL program

EXERCISE N° 17: Residents of a city pay tax according to the following rules:

- Men over 20 pay tax
- Women pay tax if they are between 18 and 35 years old
- The others do not pay tax

Write an algorithm that asks for the age and gender ('M' or 'F') of a resident and displays whether they are taxable.

Test the algorithm with a 20-year-old woman, an 18-year-old man and a 35-year-old man.

EXERCISE N° 18: Write a program called CALCULATOR, which reads in this order:

- 1) The first real.
- 2) Arithmetic operator (+, -, *, /).
- 3) The second real.

Each valid operator corresponds to a calculation that should be performed and display result or an error message, if applicable.