ENR145 Assignment #1

Due: 1/23/25 9:00 pm

1) Be familiar with the binary number system
   1.1) Practice, until you can write out the binary numbers and its decimal equivalents without the help of this look-up table:

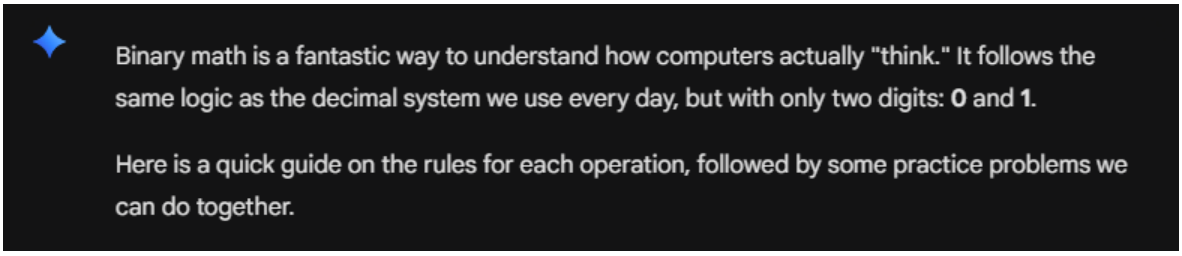
4-Bit Binary Numbers	Decimal Equivalents
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	10

   1.2) Practice addition, subtraction, and multiplication of two binary numbers:

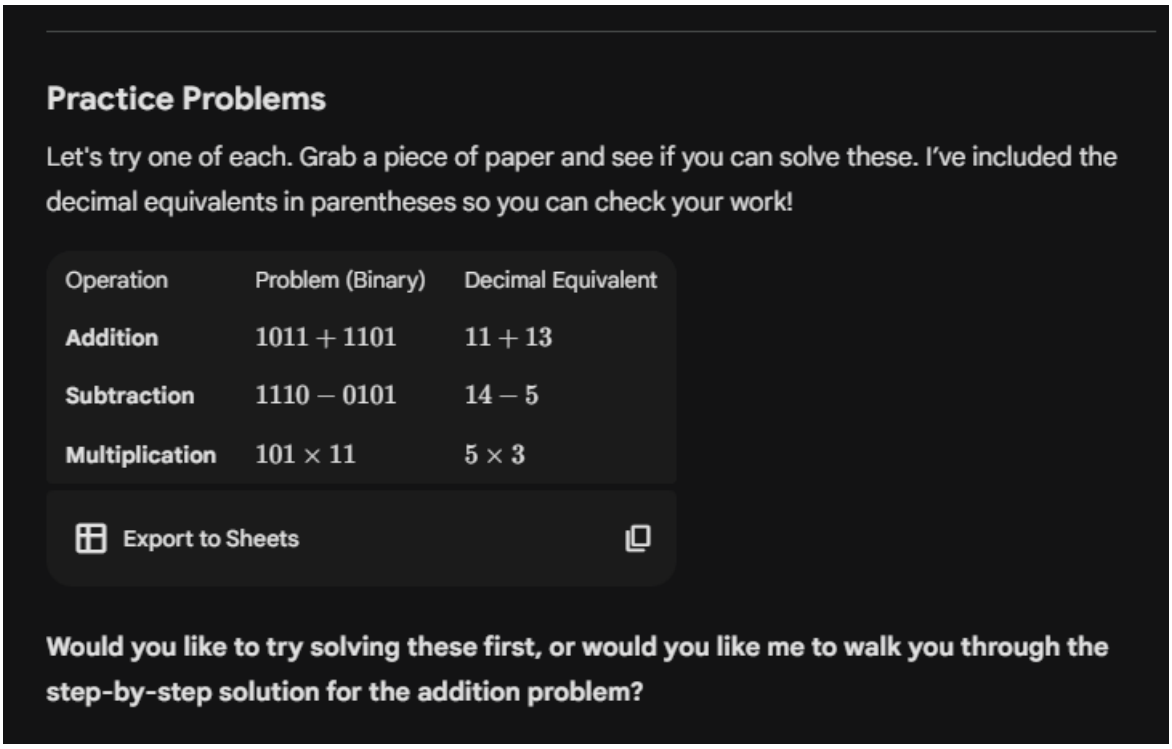
Try out AI tutoring for this task, use Gemini (or any AI of your choice), and prompt the following message:

help me practice addition, subtraction, and multiplication of two binary numbers

What you will get (I hope) will be something like that:

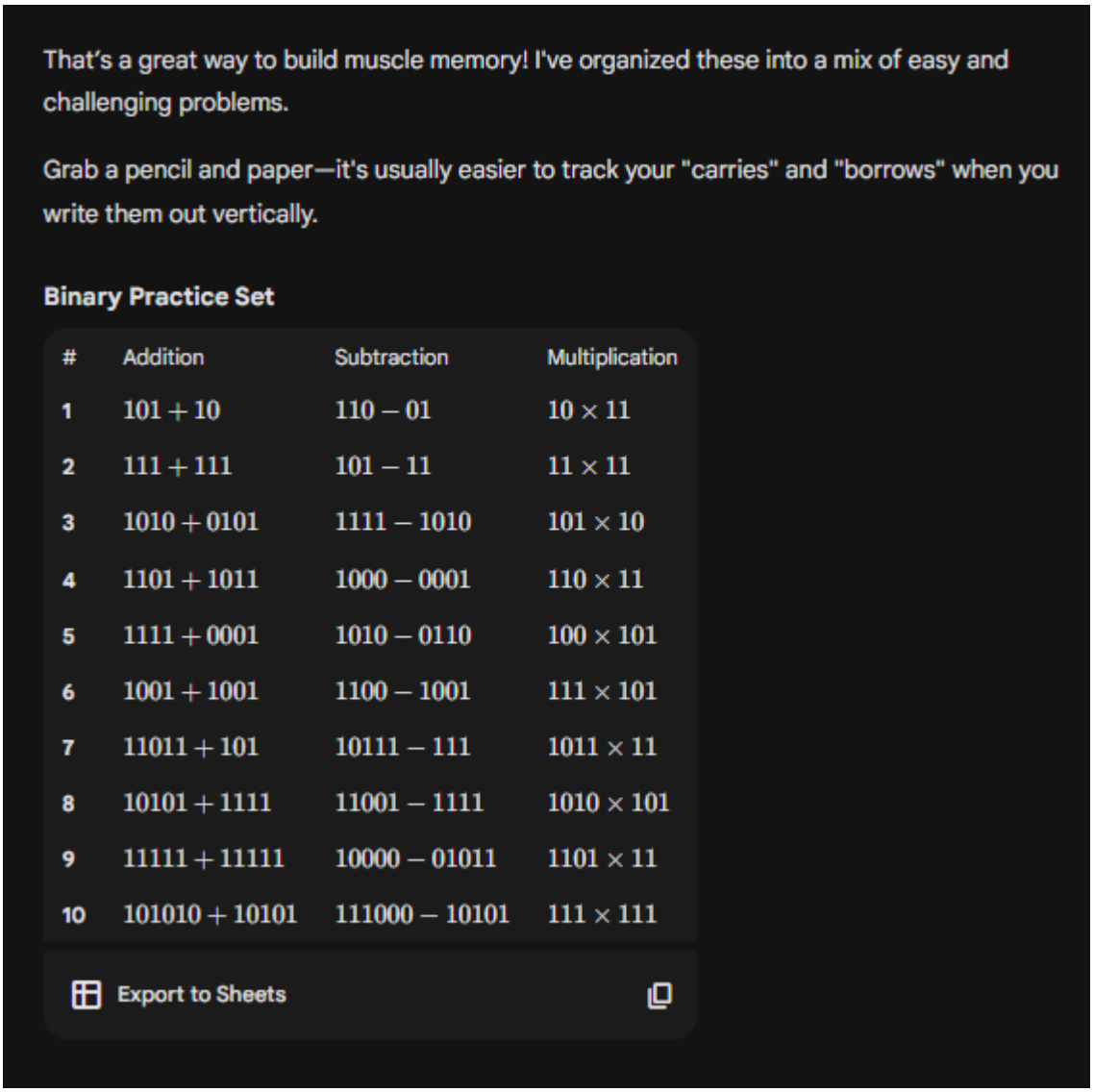


Summary of rules skipped.



The AI will guide you through as you wish. Once you are comfortable with the binary math. To finish the task, prompt it to give a list of 10 addition, subtraction, and multiply to practice.

Here's what I got:



That's a great way to build muscle memory! I've organized these into a mix of easy and challenging problems.

Grab a pencil and paper—it's usually easier to track your "carries" and "borrows" when you write them out vertically.

Binary Practice Set

#	Addition	Subtraction	Multiplication
1	$101 + 10$	$110 - 01$	10×11
2	$111 + 111$	$101 - 11$	11×11
3	$1010 + 0101$	$1111 - 1010$	101×10
4	$1101 + 1011$	$1000 - 0001$	110×11
5	$1111 + 0001$	$1010 - 0110$	100×101
6	$1001 + 1001$	$1100 - 1001$	111×101
7	$11011 + 101$	$10111 - 111$	1011×11
8	$10101 + 1111$	$11001 - 1111$	1010×101
9	$11111 + 11111$	$10000 - 01011$	1101×11
10	$101010 + 10101$	$111000 - 10101$	111×111

Export to Sheets

And AI can even check the answer for you.

As a proof of efforts, please take screen shorts of the practice set you got, and the answer check generated by AI after you submitted your work. Please submit the screenshots in a slides format.

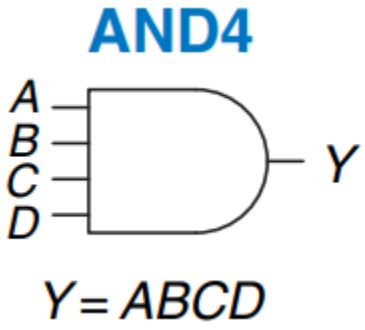
1.3) Work out this problem on your own (no AI, but you can use python to do the base conversion). Write down/type out/screen shot the whole process:

The solutions to the quadratic equation $x^2 - 11x + 22 = 0$ are $x = 3$ and $x = 6$. What is the base of the numbers?

2) Logic gates:

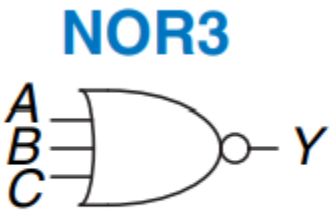
Get familiar with the AND, OR, NOT and XOR gate. The symbol, the truth table, and find out the truth table given a logic gate combo:

2.1) What will be the truth table of this four-input AND gate?



$$Y = ABCD$$

2.2) What will be the truth table of this three-input NOR gate?



$$Y = \overline{A + B + C}$$

Work out this problem on your own (no AI, no google), submit the clearly labeled truth table in slides.