Total 15 points

1. (1 point) Why is assembly language not usually used when writing large application programs?

   Assembly Language is not portable for multiple operating systems. It is also more prone to errors due to the nature of low-level languages.

2. (1 point) Assume that you have three 8-bit storages (registers) named A, B, and C to store binary numbers. Register A contains 11101011 and register B contains 10110110. Compute A+B and store the value in C register. What is the content of C register the computation? Show the computation in details with carries.

   11101011
   10110110

This will result on an overflow error since the addition of registers will produce a value higher than 8 bits.

If it does not result on an overflow it can only handle the values from 2^7 to 2^0 which would be

10100001

3. (2 points) Assume that you have 4-bit storage to store the numbers. Calculate the following operations using two's complement method. (assuming 4-bit register is used)

$$-5 - 2 + 4$$

We can add values with similar signs as if we are adding the values unsigned, then we can take its two's complements.

0101 + 0010= 0111, in two's complement that would be 1001
4 would be 0100,

1001 – 0100 = 0011

4. (1 point) What is the binary representation of the following hexadecimal numbers? Show the conversion in details.

457898A0

We just represent every single element separately as their binary value, then add them all.

4 = 0100
5 = 0101
7 = 0111
8 = 1000
9= 1001
8= 1000
A = 1010
0 = 0

BINARY 10001010111100010011000101000000

This is for decimal representation. (to check the value)
16^7 * 4 + 16^6 * 5 + 16^5 * 7 + 16^4 * 8 + 16^3 * 9 + 16^2 * 8 + 16^1 * 10 + 16^0 * 0 = DECIMAL 1165531296

5. (2 points) What is the *16-bit* hexadecimal representation of the following *signed decimal* integer? Show all the steps of conversion in details.

    -39

27 is the 16-bit hexadecimal representation of 39,
We then need to do hex subtraction (from the value of F), which makes it FFE8
Finally add one. FFE9

6. (2 points) What is the decimal representation of each of the following *signed binary* numbers?

    a. (1 point) 1001 0101

We first get rid of the MSB which is the leftmost character here.

We then take the two's complement (verse 0s with 1s and add one at the end)

Convert this to decimal 0110 1011:

The answer is -107.

    b. (1 point) 01110111

This number is a positive number. We can take the 1 in MSB as a value not as a minus or positive sign.

The two's complement of the binary is 10001001 which then we can translate to a decimal as

119.

7. (2 point) Evaluate the following Hexadecimal expression. All the numbers are hexadecimal.

    Show all the steps of computation and the carries.

        ABC + DEF - F51

Part I

(1)   (1)
A B C
+ D E F
―――――
1

C + F = 27 - 16
B + E → 26 - 16 (9+1)

?remainder

8 A B

$A + D \Rightarrow 23 - 16$ (

Start from the rightmost C+F = B (1 in remainder)
B+E = A (1 in remainder)
B +A = 8 and we have 1 in remainder so we add it to the end
We end up with 18AB
Now let's do subtraction.

$18h = 24 - 159$

18AB
F5l
―――――
9 5 A

8. (1 point) Is it possible to store -11 in a 4-bit storage. If your answer is YES, then show how to store -11 in 4-bit register. If your Answer is No, Explain why.

   No, you cannot represent -11 in 4-bit storage. 2s compliment system (which is how we represent negative numbers) can only represent values between -8 to +7.

9. (1 point) What is the smallest decimal value you can represent, using a 183-bit signed integer? You can write the number in exponent form.
   For signed integers, the range in which we can represent is shown with this equation:
   -2^(n-1) to 2^(n-1) -1

Thus for 183, the smallest value in which you can represent is -2^182

10. (2 points) What is the Boolean expression for P?

x	y	z	P
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

Design a circuit that can produce output P for inputs x, y, and z as expressed in the table above.

Let's say that we are trying to find our equation through at three-way system. The best way to approach this would be to find values in which we can represent x and y first. Then continue with z.

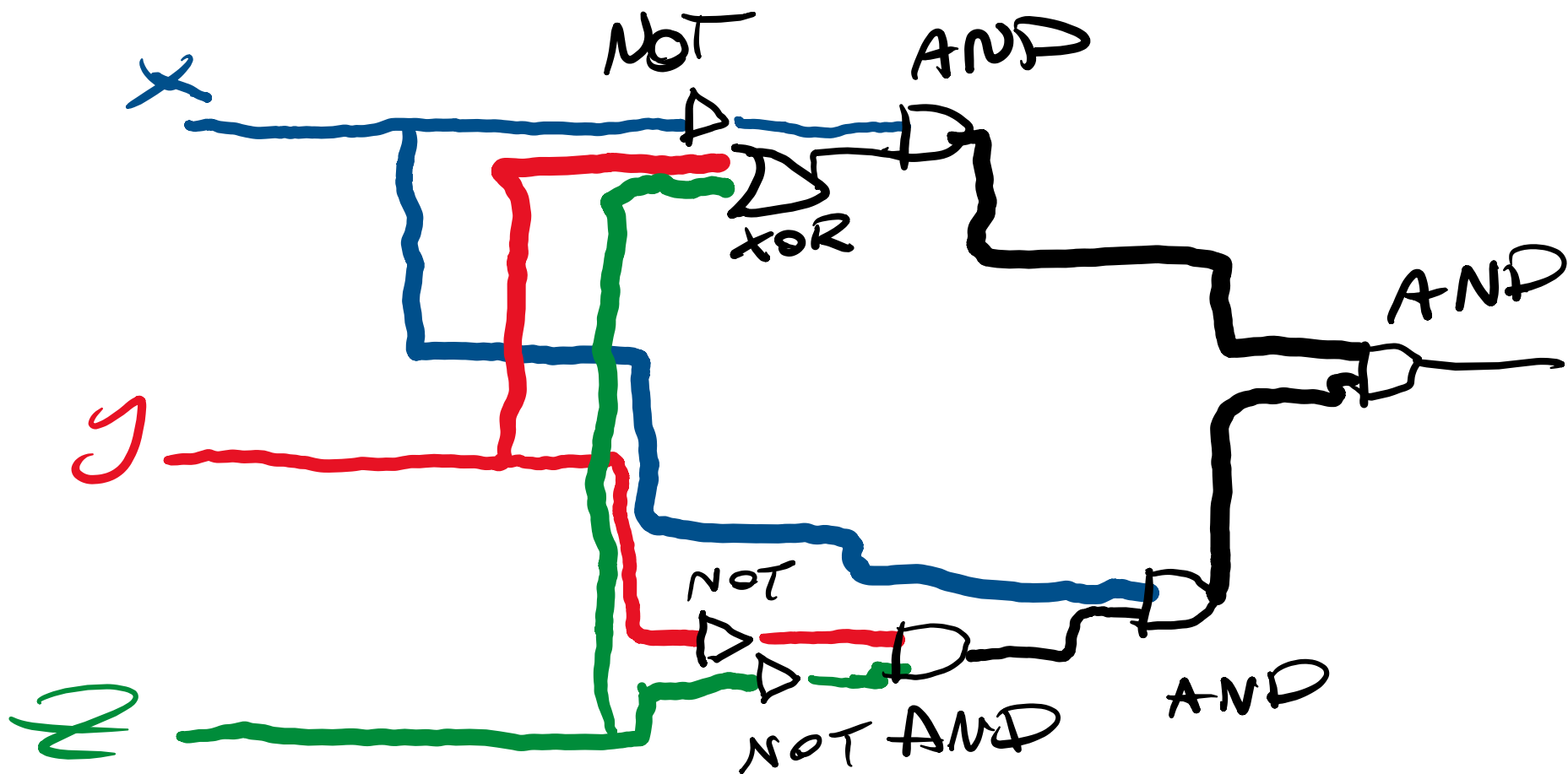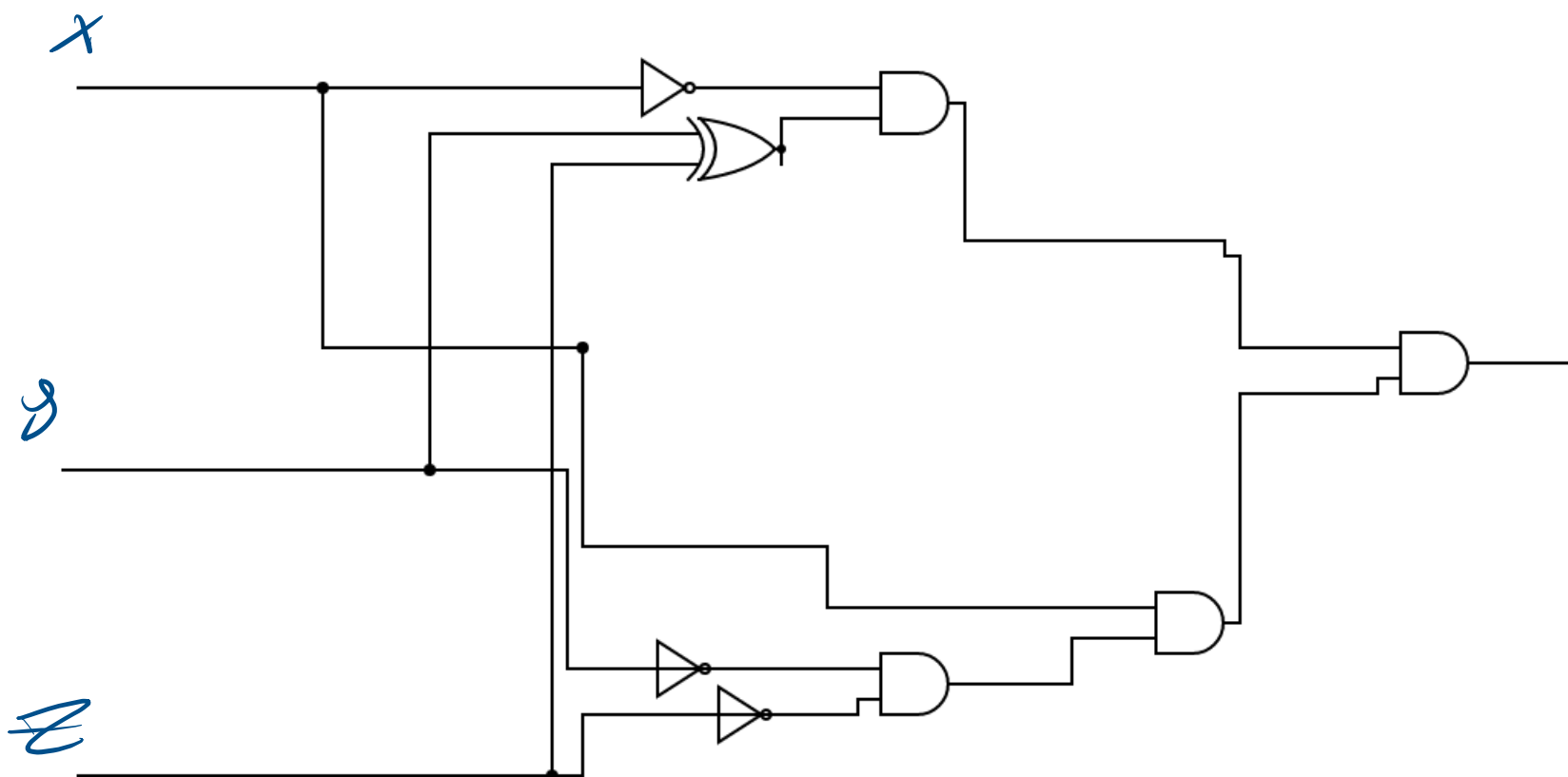| x	y	z	P
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

$$f(x,y,z) =$$

$$x'y'z + x'yz' + xy'z'$$

After this I'm going to use the distributive property here to simplify that.

$$x'(y'z + yz') + xy'z'$$

The one on the middle is actually a property, it is XOR.

$$x'(y \oplus z) + xy'z'$$

Note:

- Make sure to justify all answers – show all work.
- The Assignment must be submitted electronically through ICollege.
- You can do your work in a text editor (Microsoft word, open office, etc.)
- Or you can do it in a piece of paper, then scan or take a picture of the paper.
- Upload the answers in a pdf file to iCollege in the respective assignment dropbox.
- All work must be neat and legible. Illegible work will receive no credit. This includes work where the print contrast or darkness are too faint.
- The work that you turn in must be your own --- copying is not allowed for any assignments.
- Using another student's work as your own, allowing another student to use your work as their own, is aca

- demic misconduct.