

**Pokemon Adventure Station #1** - CSE140 Spring 2020

**Last train departure at (Due on)** Wednesday April 8th, 11:59 PM PST - Gradescope

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Please circle your final answer(s) for each question where you need to show work.

**Question 0.** Fill out the attached Academic Integrity Form (write “I Excel with Integrity” as indicated and sign).

**Question 1. T/F or FIII in the blank**

It is okay to turn in homework solutions that are identical to another persons : (T/F) F

It is okay to post homework questions or solutions to web-sites such as chegg : (T/F) F

We allow late submission for the homework: (T/F) F

Generally, what day in the week is the exam day: Monday

I get participation points by attending zoom lectures live: (T/F) F

I may switch my grade option to P/NP in week 10 this quarter : (T/F) T

**Question 2.**

It turns out that pokédexes (gives each pokemon a unique ID) from different regions use different numbering systems.

a) What is  $667_{10}$  in binary? (show your work for full credit) - circle your answer

b) how many binary digits are required to represent  $667_{10}$  in unsigned form?

c) how many binary digits are required to represent  $667_{10}$  in 2's complement form?

Q2

a.  $667 / 2 = 333$  with 1 remainder

$333 / 2 = 166$  with 1 ..

$166 / 2 = 83$  with 0 ..

$83 / 2 = 41$  with 1 ..

$41 / 2 = 20$  with 1 ..

$20 / 2 = 10$  with 0 ..

$10 / 2 = 5$  with 0 ..

$5 / 2 = 2$  with 1 ..

$2 / 2 = 1$  with 0 ..

$1 / 2 = 0$  with 1 ..

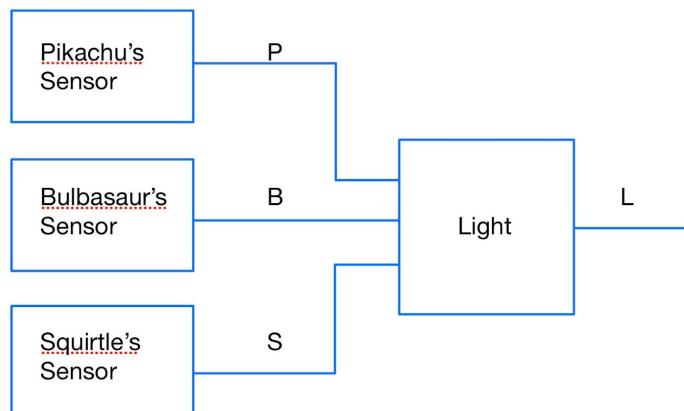
Then, when we reverse order of remainders. 1010011011

b.  $\log_2(667) = 9.38$ , which means 10 bits.

c.  $10+1 = 11$ . extra bit is needed for representing sign in 2's complement.

**Question 3.**

Ash ketchum is not sure what kind of food his pokemon would like so he decides to ask Pikachu, Bulbasaur and Squirtle for some advice. He gives each of them a toggle switch which eventually connects to the same light (L) but this light will only be turned on when at least two of the Pokemon toggles on. When a pokemon toggles their switch, its associated sensor outputs a voltage of 1. Then, Ash starts to read every single item that he thinks his pokemon will like and the Pokemon will toggles on if they hear something that they like. Now, decide a circuit using AND and OR logic gates that indicates the Pokemon like this food by producing output L = 1. You may use multi-input (eg. 3-input) gates, if needed. (You can use logic.ly to draw your circuit and test your answer.)

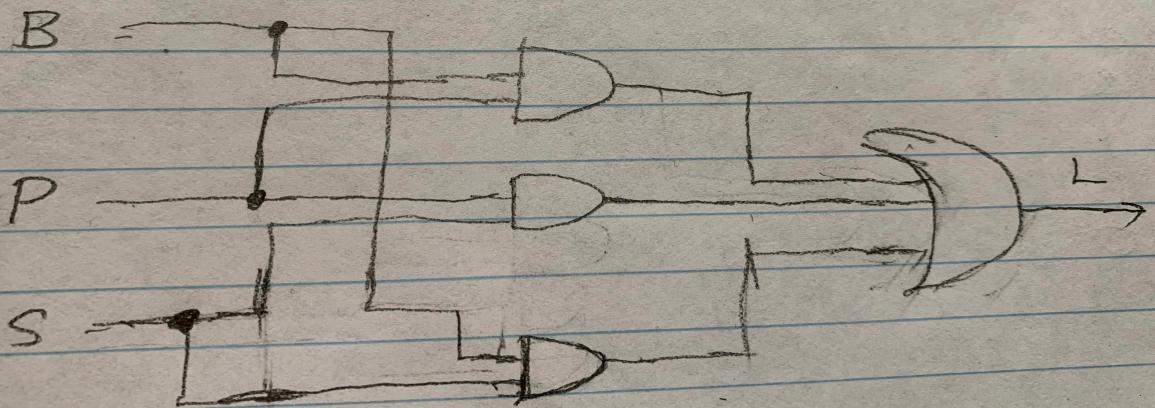


P	B	S	L
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Now, We can write sum of product terms when  $L = 1$ . then use the SOP to draw a circuit.

$$\begin{aligned}
 L &= P'BST + PB'S + PBS' + PBS \\
 &= P'BS + PBS + PB'S + PBS + PBS' \\
 &= (P+P')BS + (B+B)PS + (S+S')PB \\
 &= BS + PST + PB \\
 &= BS + PST + BP \\
 &= BP + BST + PS
 \end{aligned}$$

$$BP + BS + PS$$



**Question 4**

Reduce this expression to a two-level logic expression using the appropriate distributive law

$$Z = a(b' + c) + b'c$$

a) Sum of products form

b) Product of sums form, multiply the answer you got to show that you can get back to

$$Z = a(b' + c) + b'c$$

**Question 5**

a) Prove the following expressions

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

b) Reduce the following expressions (simplify)

$$ab'c + a'dc + a'dc' + a'd + b'cd$$

4.  
a

$$\begin{aligned} Z &= ac(b'+c) + b'c \\ &= ab' + ac + b'c \end{aligned}$$

sum of products.

b

$$\begin{aligned} Z &= ab'c + b'c \\ &= (b'c + a)(b'c + b' + c) \\ &= (b'c + a)c(b'c + 1 + c) \\ &= (a + b'c)(b'c + 1 + c) \\ &= (a + b')(a + c)(b' + c) \\ &\quad [ \underline{(a + b')(a + c)(b' + c)} ] \\ &= (a + b')a + (a + b')c + (b' + c) \\ &= ab' + abc + b'c + (b' + c) \\ &= (ab' + b'c) + (abc + c) + (b' + c) \\ &= a(b' + c) + b'c \\ &= ab' + ac + b'c \\ &= ac(b' + c) + b'c \end{aligned}$$

5.

$$(X+Y')(X+Y'+Z')(X'+Y+Z') = XY + Y'(X'+Z')$$

$$(X \cdot X + X \cdot Y' + X \cdot Z' + XY' + Y' + Y'Z') \cdot (X' + Y + Z')$$

$$(X + X \cdot Y' + X \cdot Z' + X \cdot Y' + Y' + Y'Z') \cdot (X' + Y + Z')$$

$$(X(1 + Y' + Z' + Y' + Y'Z')) \cdot (X' + Y + Z')$$

$$(X + Y')(X' + Y + Z')$$

$$(X' + Y + Z')X + (X'' + Y + Z')Y' + (X' + Y + Z')Z'$$

$$XX' + XY + XZ' + X'Y' + YY' + Y'Z'$$

$$XY + XZ' + X(Y' + Y(Z'))$$

$$XY(Z + Z') + XZ'(Y' + Y) + (X + X')Y'Z' + X'Y'$$

$$XYZ + XYZ' + XYZ' + XY'Z' + XY'Z' + X'Y'Z' + X'Y'$$

$$= XYZ + XYZ' + X'Y' + XY'Z' + X'Y'Z'$$

$$XY + X'Y' + XY'Z' + X'Y'Z'$$

$$XY + X'Y' + Y'Z'$$

$$XY + Y'(X' + Z') \Rightarrow RLS.$$

5b

5. b.

$$ab'c + a'dc + a'dc' + a'd + b'cd$$

$$= ab'c + a'd(c+c'+1) + b'cd$$

$$= ab'c + a'd(1+1) + b'cd$$

$$= ab'c + a'd + b'cd$$

$$= ab'c + b'cd + a'd$$

$$= b'c(a+d) + a'd$$

$$= a'd + b'c(a+d)$$

# How to Excel with Integrity in CSE 140<sup>1</sup>

At UCSD, academic integrity means that you have the courage, even when it is difficult, to only submit academic work that is honest, responsible, respectful, fair and trustworthy. When you excel with integrity in computer science, it means that you:

Honest	submit work that is a truthful demonstration of your knowledge and abilities (rather than the knowledge and abilities of another)
Responsible	manage your time so that you are not pressured to complete an assignment at the last minute
Respectful	acknowledge the contributions of others to your work by citing them when you've used their words or ideas (e.g., after you've spoken to classmates or after you've used portions of a code written by another if permitted)
Fair	complete your academic work according to stated standards and expectations even when it takes longer or you're struggling
Trustworthy	can be trusted to be honest, responsible, respectful and fair even when no one is watching you.

When you act contrary to these values, you are cheating. Cheating undermines trust between students and professors, the value of the UCSD degree, and your learning/development of skills. Thus, incidents of cheating includes:

- While we can't list every behavior that would be cheating, we can give you some illustrative examples like the following: Submitting any source code written by another person or copied from another person, submitting homework answers which were produced by another student.
- Submitting code/homework you have previously submitted to another course for credit without first obtaining permission from the instructor. The same restriction holds for publicly available code/homework solutions that you haven't written. Taking notes taken during any discussions with classmates about an assignment is prohibited.
- Using words or text written by someone else without citing text appropriately. Every figure or sentence fragment must be appropriately decorated with quotation marks or indentation to indicate very clearly that someone else wrote the text. In addition, the passage must be labeled with a citation or citation number which refers to a footnote or bibliographic entry. Citing a paper once is **not** enough. Remember: citations should be used to illuminate a viewpoint which you hold. They are not a substitute for expressing your own ideas in your own words.
- Submitting any portion(s) of an assignment you have previously submitted for credit in another course.
- Copying from a neighbor during an exam or using an unauthorized aid to help you on your exam
- Altering a graded exam or assignment and resubmitting it for regrade
- Allowing someone else to complete an assignment or exam for you, or allowing them to pretend to be you in class (e.g., by signing an attendance form or clicking for you).
- Making available to others source code, documentation, or notes useful for completing an assignment. You should neither produce, procure, nor accept such material. This includes students in current and future offerings of the course, and applies to electronic transmissions including email, web pages, ftp, and so on, as well as hard copy such as source code listings.

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<sup>1</sup> This document was written in part by Rick Ord, CSE Lecturer and Dr. Bertram Gallant, Director of the UCSD Academic Integrity Office.

If the behavior you are considering isn't listed here, don't assume that it is allowed. Rather, you should always assume "independent work unless told otherwise". And before completing your academic work in a certain way, you should ask yourself "is it honest, respectful, responsible, fair and trustworthy?" You can also ask yourself "would I be okay if my methods were exposed to the TA or the Professor?" and if the answer is no, you shouldn't do it.

**If you have any questions about what is and isn't cheating, be sure to discuss them with the instructor.**

Any student who cheats, thereby undermining integrity, will be reported to the Academic Integrity Office. Students who cheat face various disciplinary sanctions as well as academic penalty imposed by the instructor in the course. Academic penalties include, but are not limited to, receiving a grade of 0 for the assignment or test in question, and receiving an 'F' for the course.

For more information on academic integrity, including how you can excel with integrity, as well as information on sanctioning guidelines for cheating, visit the Academic Integrity Office website at:

**<http://academicintegrity.ucsd.edu>**

**Confirmation of Agreement to Excel with Integrity**

Please affirm your adherence to this agreement by writing below the following statement:

"I Excel with Integrity."

I Excel with Integrity

By signing this form, I, Xie, Guohua, a student enrolled in CSE 140  
(print last name, first name)

affirm the principle of academic integrity and commit to excel with integrity by completing all academic assignments in the manner expected as described above, informing the instructor of suspected instances of academic misconduct by my peers, and fully engaging in the class and its related assignments for the purpose of learning.

Guohua

Signature

A14770047

04/08/20

Student ID

Date