CSC165H1: Problem Set 0 Sample Solutions

Due Wednesday September 20 before 10pm

Note: solutions are incomplete, and meant to be used as guidelines only. We encourage you to ask follow-up questions on the course forum or during office hours. In this problem set, you will **type** a document containing both text and mathematics. You are welcome to use your favourite word processor, provided it can produce suitable symbols and align equations. You will need to dig through the instructions, or else look at another tool, for example:

Google docs equation editor: See Google Docs equations

LaTeX: See LaTeXtutorial

1. Create a title for your document that shows the course code (CSC165H1), the phrase "Problem Set 0", and the due date.

Solution

CSC165H1 Problem Set 0
due September 20th

2. Create an unordered list, with bullet points, showing the courses you are taking this term. Please give the course number, title, and the name of your instructor for each course.

Solution

- CSC104, Computational Thinking, Smith
- CSC165, Mathematical Expression and Reasoning for CS, Heap
- CSC148, Introduction to CS, Horton
- MAT137, Calculus, Rosenthal
- STA247, Introduction to Probability, Gibbs

3. Let S_1 be the set of all even positive integers, and S_2 be the set of all integers less than 15. List all of the elements in the $S_1 \setminus S_2$ using set notation (i.e., $\{\ldots\}$).

Solution

$$S_1 \setminus S_2 = \{16, 18, 20, 22, 24, \ldots\}$$

4. Write down the truth table for the propositional formula $(p \wedge q) \Rightarrow s$. There should be *eight* rows in your table (plus a header row).

Solution

p	q	s	$(p \wedge q) \Rightarrow s$
T	T	T	T
T	T	F	F
T	F	T	T
T	F	F	T
F	T	T	T
F	T	F	T
F	F	T	T
F	F	F	T

5. Show the steps involved in isolating x in the following equation (assume n is positive). Do *not* just show the final result: we're looking for at least two or three steps here, to demonstrate that you can align the equal signs.

$$3^{x-2} = n^x$$

Remember that *isolating* a variable means rewriting an equation so that the variable appears on one side by itself, and no occurrences of that variable appear on the other.

Hint: divide both sides by n^x or 3^x. You might want to review logarithms if you get stuck here.

Solution

$$\begin{aligned}
3^{x-2} &= n^x \\
\frac{3^x}{n^x} &= 3^2 = 9 \\
\log_3\left(\frac{3^x}{n^x}\right) &= 2 \\
\log_3(3^x) - \log_3(n^x) &= 2 \\
x\log_3(3) - x\log_3(n) = x(1 - \log_3(n)) &= 2 \\
x &= \frac{2}{1 - \log_3(n)}
\end{aligned}$$