CPSC 421/501

- Welcome
- Course page: Navigate from
  www.cs.ubc.ca/~jf/courses
- Instructor: Joel Friedman, jf@cs.ubc.ca
- Piazza page
  piazza.com/ubc.ca/winterterm1 2019/cpsc421
- Grade:
  421 ← 55% (f) + 35% max(m,f) + 10% max(h,m,f)
  f,m,h = final, midterm, homework
  501 ← 80% (formula for CPSC 421)
  + 20% (essay)
- Homework, Office Hours : Details TBA

- Course Content: What is "P vs. NP", how to perhaps solve, and how not to solve, P vs. NP

Old, mid 1900's view:

Chapter 1 - Regular languages, ~~Chapter 2 - Context-free languages~~

Chapter 3 and on - Turing machines, - -

For first week or so, begin with handout on course webpage:

(0) Decision Problems and Languages Ch.0 [Sip]

(1) Self-referencing "Paradoxes" and "theorem proofs"

(2) Cantor's Theorem and Uncountable Sets

Ch 0: Languages

Decision Problems: yes/no

primality: Given $n \in \mathbb{N} = \{1, 2, 3, \ldots\}$, is n prime?

3-colourability: Given a graph, is it 3-colourable?

vacation email: Given a string, does the word "vacation" occur as a substring

PRIMES = {

- Alphabet is a finite, non-empty set
- A word/string is a finite sequence in the alphabet

$A = \{0, \ldots, 9\}$, string over A

$(3,4,7,9,2) = 34792$

- A language over A is a subset of all strings over A

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Primes: $D = \{0, 1, \ldots 9\}$, $D^* = \{\text{all strings over } A\}$

$PRIMES = \{ s \in D^* \mid s \text{ represents a prime number} \}$

$421, 2, 3, 5, 7, 127 \in PRIMES$

$221, 320, 420 \notin PRIMES$

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Is $0421 \in PRIME$?

What does

$$PRIMES = \{ s \in \Sigma^* \mid s \text{ represents a prime number} \}$$

really mean? Need to be more precise

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Possibility 1:

$$PRIMES_1 = \{ s = s_1 s_2 \ldots s_k \mid s_i \in \Sigma,\ s$$

$$s_1 10^{k-1} + s_2 10^{k-2} + \ldots + s_k 10^0$$

$$\text{is prime} \}$$

$$PRIMES_2 = \{ \langle n \rangle \mid n \in \mathbb{N},\ n \text{ is prime} \}$$

"description of n"

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graph $\rightsquigarrow$ computer : $\langle \text{graph} \rangle$???

Descriptions of 127:

$(127)_{\text{base 2}} = 1111111$

$(127)_{\text{Hex}} = 7F$

$(127)_{\text{English}} =$ one hundred and twenty-seven

$(127)_{\text{French}} =$ cent vingt-sept

$(127)_{\text{Klingon}} =$ wa'vatlh wejmatl Soch

$(127)_{10} = 127$