Sequences & Regular Expressions

* Sequence
- list of ordered objects
* Formulas
- explicit - $a_n = 2^n + n - 1$
- n^{th} term defined in terms of n
- recursive - $a_1 = 0$, $a_2 = 1$, $a_n = a_{n-1} + a_{n-2}$ $n \geq 1$
- words can be a sequence
* Characteristic Function
- tells you if element is there
* Countable / Uncountable set
- a set is countable if it corresponds to a sequence
- sets can be arranged in a list - it will be countable
- rationals & integers are countable, reals & irrational are not
* Strings
- λ = empty string
* Alphabet words
- for set A, the set A^* contains all finite sequences of elements of A
- A is an alphabet, A^* is words
* Regular Expressions
- A regular expression over A, is a string constructed from elements of A and symbols $(\ ), \vee, {}^*, \lambda$
- Let $A = \{0, 1\}$
- 0^* is a regular expression, 00 is $(01)^*$

- v means or, $(0 \vee 1)^*$ is a regular expression
- $1(0 \vee 1)^*$
- $0 \vee 1^*$: $\{0, 1, 11, 111, 111\}$
- give a regular expression for the set of strings over $\{a, b, c\}$ in which all a's precede b's which in turn precede c's
- $a^* b^* c^*$
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