

School of Computing and Information Systems  
The University of Melbourne  
COMP90042  
NATURAL LANGUAGE PROCESSING (Semester 1, 2022)  
Workshop exercises: Week 8

**Discussion**

1. What are regular grammar and regular language? How are they different?
  - (a) Regular languages are closed under union, intersection and concatenation. What does it mean? Why is it important?
  - (b) Draw a Finite State Acceptor (FSA) for word morphology to show the possible derivations from root forms using the words: play, played, playing; walk, walked, walking; sit, sat, sitting.
  - (c) What are Weighted Finite State Acceptors (WFSAs)? When and why are they useful?
2. What is **parsing**?
3. Consider the following simple **context-free grammar**:

```
S -> NP VP
VP -> V NP | V NP PP
PP -> P NP
V -> "saw" | "walked"
NP -> "John" | "Bob" | Det N | Det N PP
Det -> "a" | "an" | "the" | "my"
N -> "man" | "cat" | "telescope" | "park"
P -> "on" | "by" | "with"
```

- (a) What changes need to be made to the grammar to make it suitable for **CYK parsing**?
- (b) Using the CYK strategy and the above grammar in CNF, parse the following sentences:
  - i. "a man saw John"
  - ii. "an park by Bob walked an park with Bob"
  - iii. "park by the cat with my telescope"
    - This sentence has no parse, because the cell [0,7] doesn't have an S.