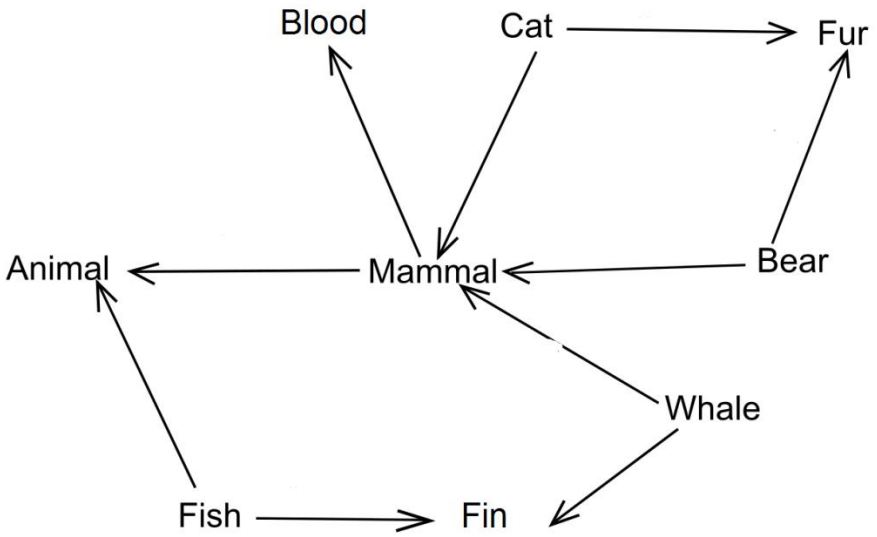
Computational Linguistics 2017-2018
Sheet 2

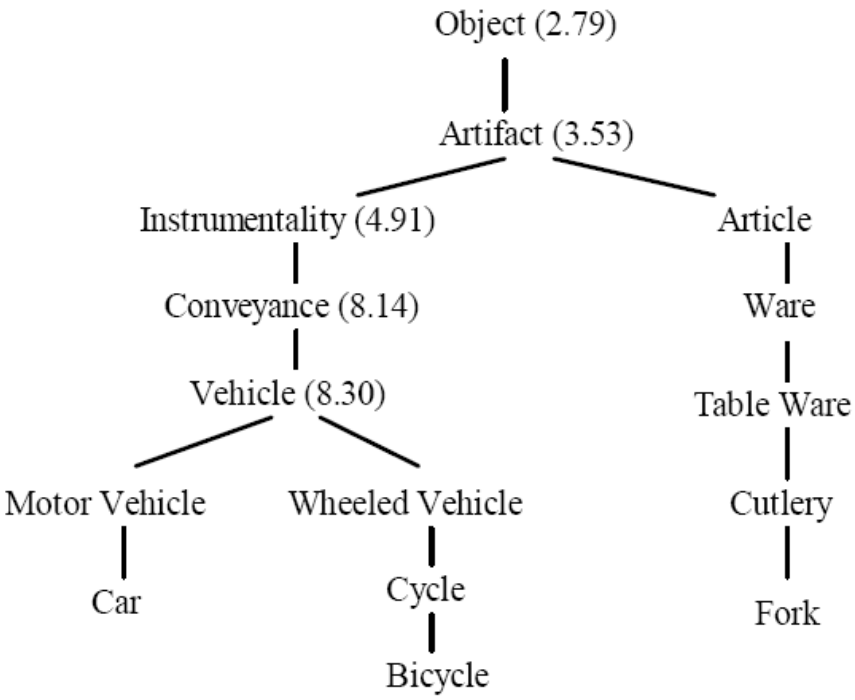
Q1) Define different semantic relations on the given example of WordNet, by selecting between (Hyponymy , Meronymy) relations.



Solution:

Mammal - Blood	Meronymy
Mammal - cat	Hyponomy
Mammal - Bear	Hyponomy
Cat - Fur	Meronymy
Bear - Fur	Meronymy
Animal – Mammal	Hyponomy
Animal - Fish	Hyponomy
Mammal - Whale	Hyponomy
Fish - Fin	Meronymy
Whale - Fin	Meronymy

Q2) According to the following WordNet sub-graph with the associated Information Content (IC) values, Calculate the **Resnik Similarity** measure (Sim_{Res}) between the two concepts of (Car, Bicycle)



Solution:

The Resnick similarity between any two concepts is calculated by:

Sim_{Res} (S_1, S_2) = IC [lcs(S_1,S_2)]

Where the (lcs) is the least common-subsumer between the two concepts S_1 and S_2,

According to the WordNet Sub-graph:

LCS (Car, Bicycle) = Vehicle

Sim_{Res} (Car, Bicycle) = IC[Vehicle] = 8.3

Note:

If given the probability P(c) of the word (c) instead of the the Information Content (IC) value, the (IC) can be calculated using the equation **IC(c) = -log P(c)**

Q3) Given the following CFG, Apply **Top-Down Parsing with Bottom-Up Filtering** using left corners to state if the sentence **"The song eats a furry cat"** is valid or not.

N : {S, NP, VP, DT, N, V, Aux, Nominal}

S : {S}

Σ: {canary, cat, song, furry, sings, eats, the, this, a, an, did, does, has, have}

P:

S → VP
S → Aux NP VP
S → NP VP
NP → DT Nominal
Nominal → N
Nominal → N Nominal

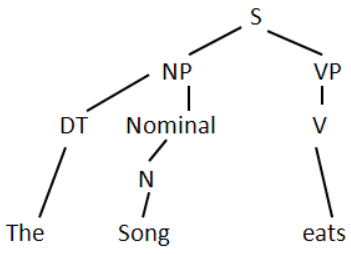
VP → V
VP → V NP
V → sings | eats
N → cat | song | canary | furry
DT → the | this | a | an
Aux → did | does | has | have

Solution:

First: construct the left corner table

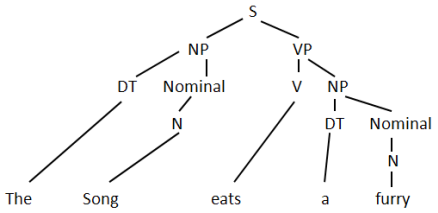
Category	Left Corner
S	V, Aux, DT
NP	DT
VP	V
Nominal	N

Second: apply the parsing

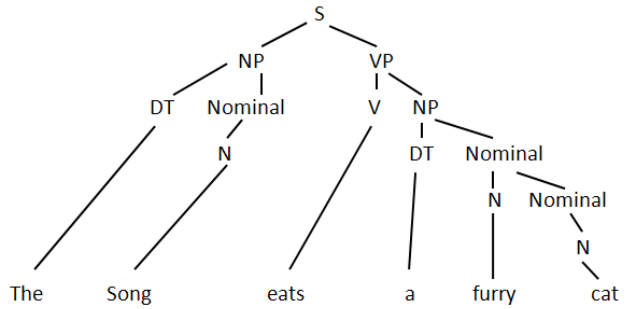


the tree is complete while the sentence is not complete

→ apply backtracking



Again apply backtracking



The sentence is valid.