TF-10Fcoffee duc1 = 10310(25+1) x 10510(4/2) 0.4259 TF-10FCOFFIE do c2 = 10510 (18+1) x 10510 (4/2) = 0.3849 7F-10fcoffie doc3 = lose 0 x 10510(4/2) TF-IDFLOFFE docu= 0x log10 (4/2) 1 6 TF-10Fraction decl = 103(20+1) x 105 (4/4) 7F-10Fracetion doc2 = 103(23+1) + 105(4/4) TF-10 + value tim doc3 = 203 (18+1) + Log (4/4) TF+Dfvaertin doc4 = 109(13+1) + 109 (4/4) æ

Trebandictes that

TFIDE scores for coffee indicates that it is an descriminating term in doc1 and doc2 but not in DOC3 and DOC4, on the one hand, "vacation" is all zero in all document. This suggest that it is not relevant in any of the document.



TF 10 F CUPP DOCT = 0 x 10910 (4/3) = 0

TF 10 F CUP doc2 = 10510 (87+1) x 105 (4/3) = 0.2429

TF 10 F CUP doc3 = 10510 (78+1) x 103 (4/3) = 0.2371

TF 10 F CUP doc4 = 109 (3+1) x 103 (4/3) = 0.0752

TF10F summer deel = log(10+1) + log(4/4) = 0

TF10F summer deez = log(12+1) + log(4/4) = 0

TF10F summer do C3 = log(15+1) + log(4/4) = 0

TF10F summer do C4 = log(80+1) + log(4/4) = 0

TFIDF work does = 103(3+1) *103(414) = 0

TFIDF walk doc2 = 103(6+1) *103(414) = 0

TFIDF walk doc3 = 103(32+1) * 103(414) = 0

TFIDF walk doc4 = 103(32+1) * 105(414) = 0

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	DOCL	DUCE	0063	DOCY
CUP	.0	0.2429	0.2371	0.0752
Summer		O	0	0
coffee	004259	0.3849	0	6
walk	D	0	D	0
Valetion	0	0	0	D
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duce similarly = cos. similar to = \$2.3

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Cos(doc1, doc2) = 0.163929 10-42892 x 0.24292+0.38492 0.8456 Cosc(doc1, doc3) = 0

[0.42392 x [0.237]2 = 0 cos (poch doc4) = 0. Dot product is zero = 0.533687 los/doc2, doc3) -0.057592 0.455136 x 0-23711 cos/doca docu) -0.018266 = 0.533687 0-435136 X 0-0752 Cos(docs, docy)-0.01783 0.2371 x 0.0750 most similar docz doc4 doci doca docz docz docz docy least similar doct docs doci doc4

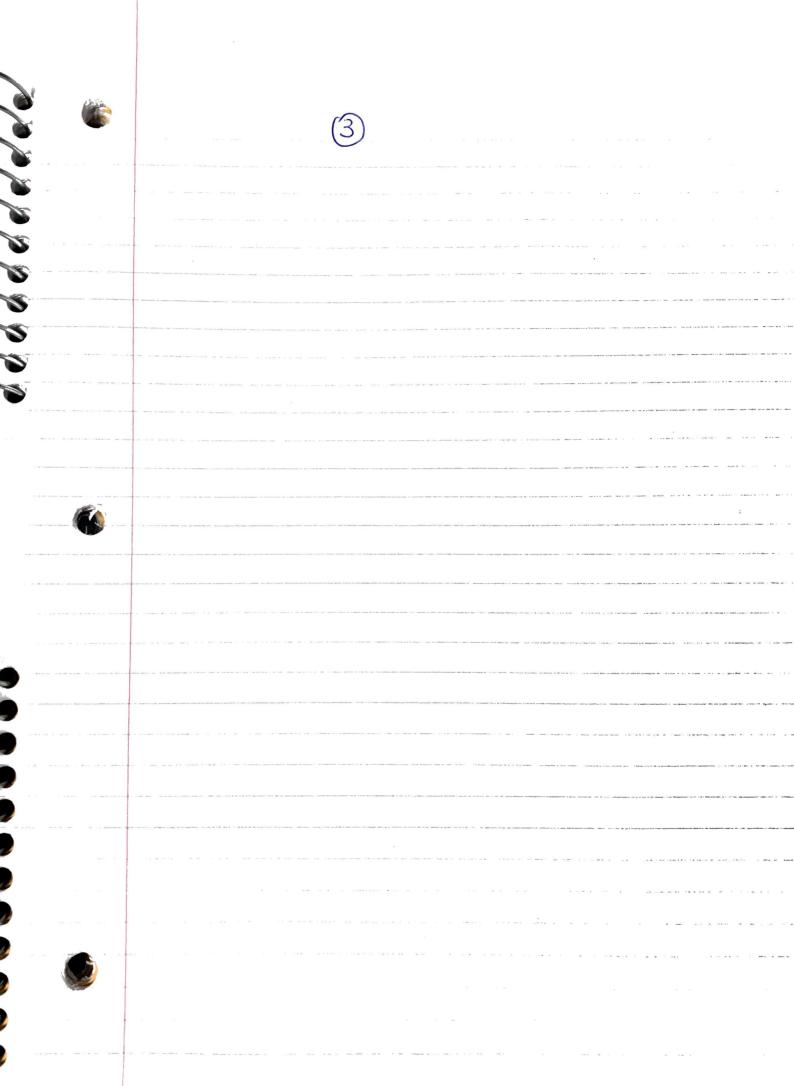
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Computer	5290	2351	19	9	42	7711
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 Valetion	14	53	34	5	9	115
Court (conteset)	12841	6394	944	6849	4099	31127

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Whitewood	0.0461	0.01644	0.0003	0.0013	0.0001	0.0642
Computer	0-1699	0-0755	0.0006	0.0003	0.0013	0-2471
mouse	0.1960	6-1100	0.0113	0.1366	0.0171	0-4710
horse	0-0003	0.0017	0-01705	0.0817	011129	0-2133
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morek	0.0126	0.18527	0	0.3986	D
por se	0	0	0	0.7875	1.988
Valation	0	1.1643	3-2945	0.2969	0

whiteboard = [0.7991, 0.3181, 0, 0,07 Computer = [0.7336, 0.5723, 0, 0,0] mouse = [0:0126,0:18527,0,0:3986,0] horse = [0,0,0,0,7875,1,988] vacetion = [0, 1.1643, 3.2945, 0.2969, 0] Whiteboad - mouse cosine simlaits = 2-5 Witeboard computer = 0.768268 = 0-960037 D. 86086 x 0-930428 Whiteboard mouse = 0.069003 = 0-182447 0.860086X 0.439734 - 0-031181 horse - vacetion = 0.233809 2.138294 x 3.506775 most simlar Will board computer Least similar white board mouse horse vacation



```
#question a
def find_hypernym():
    house = wn.synset('house.n.01')
    hypernyms = house.hypernyms()
    if hypernyms:
        print("Hypernyms of 'house:")
        for hypernym in hypernyms:
            # Split the hypernym name by periods and keep only the first part
            hypernym_name = hypernym.name().split('.')[0]
            print(hypernym_name)
    else:
        print("No hypernyms found for 'house.n.01'.")
find_hypernym()
Hypernyms of 'house:
building
```

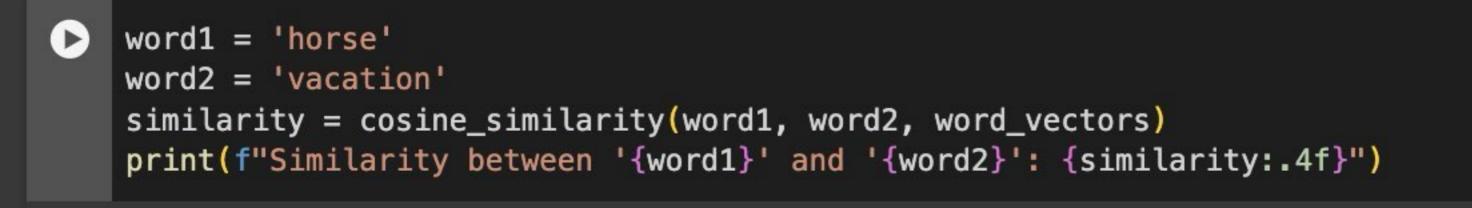
dwelling

```
from nltk.corpus import wordnet as wn
# Get the synsets for the words "mouse" and "horse"
mouse_synsets = wn.synsets('mouse')
horse_synsets = wn.synsets('horse')
vacation_synsets = wn.synsets('vacation')
# Get the first synset for each word
mouse_synset = mouse_synsets[0]
horse_synset = horse_synsets[0]
vacation_synset = vacation_synsets[0]
# Calculate the path similarity between the first senses of "mouse" and "horse"
mouse_horse_similarity = mouse_synset.path_similarity(horse_synset)
print("Path similarity between 'mouse' and 'horse':", mouse_horse_similarity)
# Calculate the path similarity between the first senses of "horse" and "vacatio
horse_vacation_similarity = horse_synset.path_similarity(vacation_synset)
print("Path similarity between 'horse' and 'vacation':", horse vacation similari
```

```
#question c
import numpy as np
# Load Glove word vectors
def load_glove_vectors(file_path):
    word vectors = {}
    with open(file_path, 'r', encoding='utf-8') as f:
        for line in f:
            values = line.split()
            word = values[0]
            vector = np.array(values[1:], dtype='float32')
            word vectors[word] = vector
    return word_vectors
# Compute cosine similarity between two words
def cosine similarity(word1, word2, word vectors):
    if word1 not in word_vectors or word2 not in word_vectors:
        return None
    vec1 = word_vectors[word1]
    vec2 = word_vectors[word2]
    dot_product = np.dot(vec1, vec2)
    norm1 = np.linalg.norm(vec1)
    norm2 = np.linalg.norm(vec2)
    similarity = dot_product / (norm1 * norm2)
    return similarity
# Example usage
glove file path = '/content/drive/MyDrive/nlp/hw5/glove.6B/glove.6B.50d.txt'
word vectors = load glove vectors(glove file path)
```

```
[ ] #question d
   word1 = 'mouse'
   word2 = 'horse'
   similarity = cosine_similarity(word1, word2, word_vectors)
   print(f"Similarity between '{word1}' and '{word2}': {similarity:.4f}")

Similarity between 'mouse' and 'horse': 0.4356
```



Similarity between 'horse' and 'vacation': 0.3102