Word embeddings: Exam practice

> **Note**
>
> This document gives *examples* for tasks similar to those that will appear on the digital written exam. The solutions are provided at the end of this document, in case you first want to try solving the tasks yourself. This is not meant as an exhaustive list; the exam may also feature other types of tasks/questions than the ones shown here.

Task 4.1

For each of the following sentence pairs, what semantic relation best describes the relation between the emphasized words?

sentence pair	semantic relation
What fruit do you like? — I really like bananas.	
I put the key into the lock. — He sang in the wrong key.	
He rushed down the hallway. — The cars raced down the street.	
Today is a cloudy day. — It was very sunny outside.	

Task 4.2

Define the term “lemma” (i.e., give a brief definition of what a “lemma” is).

Task 4.3

Given two vectors $v = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$ and $w = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$, what is the cosine similarity between v and w?

Task 4.4

Here are some words in a fictional language together with their vectors in a two-dimensional embedding space:

word	vector
cavena	$(1, 4)$
ibati	$(2, 2)$
odicu	$(1, -2)$
vexa	$(-1, -2)$

Sort the four words in decreasing degree of similarity (from most similar to least similar) to the word *ibati*, assuming that similarity is measured using cosine similarity between their word vectors.

Solutions begin on the next page!

Solutions

Task 4.1

sentence pair	semantic relation
What fruit do you like? — I really like bananas.	**hypernymy**
I put the key into the lock. — He sang in the wrong key.	**homonymy**
He rushed down the hallway. — The cars raced down the street.	**synonymy**
Today is a cloudy day. — It was very sunny outside.	**antonymy**

Task 4.2

Examples of accepted answers:

- **A lemma is the word form chosen to represent a given lexeme.**
- **A lemma is the dictionary form of a word.**

Task 4.3

$$\frac{2 \cdot 1 + 0 \cdot 3}{\sqrt{2^2 + 0^2} \cdot \sqrt{1^2 + 3^2}} = \frac{2}{2 \cdot \sqrt{10}}$$

> **Note**
>
> In the exam, it is fine to enter either side of the equation above, or any equation that evaluates to the same number; you don't need to simplify them or compute the final result.

Task 4.4

a) ***ibati***
b) ***cavena***
c) ***odicu***
d) ***vexa***