# Quiz A - Version C

1. Which strings are atoms, variables, complex terms, and which are not terms?

   a. `knows(pedro, Maria)`

   b. `Blond(maria)`

   c. `loves(Pedro Maria)`

2. Represent the following assertions in Prolog.
   a. Pedro loves Ana.

   b. Carolina loves everything that is red.

3. Which queries are satisfied? When relevant, present the variable instantiation that permits unification.

   a. `line(X,point(Y,Z)) = line(Z,point(b,c)).`

   b. `line(point(X,b),point(Y,Z)) = line(point(a,Y),point(b,c)).`

4. Consider the following database:

```
lisboeta(luis).
setubalense(pedro).
setubalense('Ana').
setubalense(carolina).
portugues(X) :- lisboeta(X).
portugues(X) :- eborense(X).
portugues(X) :- setubalense(X).
```

   Which queries are satisfied? When relevant, present the variable instantiation that permits unification.

   a. `?- portugues(lisboeta).`

   b. `?- portugues (Y), setubalense (Y).`

# Quiz B - Version A

1. How does Prolog respond to the following queries?

   a. `?- [] = [_].`

   b. `?- [a,b,c,d] = [a,b,c |[d]].`

   c. `?- [] = _.`

2. In the lines below, what are the ones that are syntactically correct lists? In case it is syntactically correct, how many elements does it have?

   a. `[1|2,3,4]`

   b. `[1,2,3,4|[]]`

3. Consider the following database:

```
directTrain (forbach, saarbruecken).
directTrain (freyming, forbach).
directTrain (fahlquemont, stAvold).
directTrain (stAvold, forbach).
directTrain (saarbruecken, dudweiler).
directTrain (metz, fahlquemont).
directTrain (nancy, metz).
```

   Write a recursive predicate `travelBetween/2` that tells us whether one can travel by train between two towns, even if that requires catching more than one train.

4. Write a predicate `twotimes(In, Out)` whose argument `Out` is a list consisting in each of the elements in the left list written twice. For example, the query `twotimes([bla,45,blurb],X)` should return `X = [bla, bla, 45, 45, blurb, blurb]`, etc.

5. Consider the lists to which we will call “duplicated”, which consist in the concatenation of two identical sequences, as for instance `[bla,45,blurb,bla,45,blurb]`. Write a predicate `duplicated(In)` whose argument is a list and whose calling succeeds when that list is “duplicated”, like in the previous example. The definition of that predicate should be done by resorting to `append/3`. Consider that `append/3` is provided, and thus you do not need to write it or provide it here in this answer to call it.

# Quiz C

1. What are the three types of lexical semantic representation studied? How to obtain empirical data to support the development of semantic knowledge repositories for each of them?

2. Relating to language modeling, indicate what are the membership and the continuation problems. For each of them, indicate what type of solution can be adopted.

3. What is the difference between supervised and unsupervised machine learning?

4. Consider a multi-layer perceptron that receives 5 input values, outputs 2 values and has 3 hidden layers with 10 neurons each. How many weights does this network have?

5. In generic terms, indicate what is the result of applying the softmax function over a vector.

# Quiz D

1. The training algorithm of a neural network contains 3 major steps: 1) forward pass, 2) loss estimation, 3) backward pass. Indicate the purpose of each of the steps.

2. What are the overfitting and underfitting problems?

3. What is the difference between hyperparameters and parameters?

4. If a network training with batches of 8 examples trains on a corpus with 2048 examples, how many steps does the network take to perform two epochs?

5. During the warmup steps what happens to the learning rate?