Question 1:

a) Write down the code of Program \( P \) in the language \( L \) for which \( \#(P) = 72899 \).

b) What is the number of the following program?

[D] \[ Y \leftarrow Y + 1 \]
\[ Z5 \leftarrow Z5 + 1 \]
\[ X \leftarrow X - 1 \]
\[ \text{IF } X \neq 0 \text{ GOTO D} \]

You do not have to compute the numerical values of expressions such as \( 3^{27} \) that would result in huge numbers.

Question 2:

We have seen the trick of using the pairing function to associate numbers not only with pairs of numbers but also triplets. For example, here we create a bijection between \( z \) and triplets \( (a, b, c) \):

\[ z = <a, <b, c>> \]

We could extend this further for quadruples, for example, a bijection between \( z \) and quadruples \( (a, b, c, d) \):

\[ z = <a, <b, <c, d>>> \]

Obviously, we could modify this trick for any tuple size. Does this mean that we would not need the Gödel numbers for enumerating programs in L but could use the pairing function instead? Give a reason for your answer.