1. You are given a feedforward neural network with 10 inputs, 20 neurons in the first hidden layer, 7 neurons in the second hidden layer, and 1 output neuron. What is the total number of weights in such a neural network?

$(10 + 1) * 20 + (20 + 1) * 7 + (7 + 1) * 1 = 375$

2. A major issue when training neural networks is a "local minimum". What does it refer to and why is it an issue?

A local minimum refers to a point in the gradient where we have reached a minimum relative to our position in the gradient. But there is no way of knowing is that minimum global minimum or not. The global minimum, known as an absolute minimum, is the smallest overall value of the function.

3. What is the Mean Squared Error and what is it used for?

MSE is the average of the sum of the difference between the predicted value and the actual value squared. It is used to minimize the error between prediction and ground truth values.

4. What is Keras?

Keras is an open-source neural-network library written in Python that runs on top of Theano or Tensorflow.

5. You are given a neuron with the RELU transfer function (negative inputs become 0 and positive are copied) with 2 inputs x1 and x2 and with weights w0 = 1, w1 = 3, w2 = -4. What is the output of this neuron when x1 = 3, x2 = 1.

w0*x0 + w1*x1 + w2*x2 $= 1*1 + 3 * 3 + (- 4)*1 = 1 + 9 - 4 = 6$

6. You are given function $f(x) = x^4 - 3 * x + 7$. You want to use the gradient descent algorithm with a learning rate $\alpha = 0.01$ to find value x where f(x) is the minimum. Your initial guess is $x^{(0)} = 2$. Calculate $x^{(1)}$, the value of you guess after one round of gradient descent.

$f'(x) = 4 * x^3 - 3$

$x^{(1)} = x^{(0)} - \alpha * f'(x) = 2 - 0.01 * (4 * 2^3 - 3) = 2 - 0.01 * 29 = 1.71$