1. What exactly is a feature?

Ans: feature is a dimension of a data set or a column.

1. For a top edge detector, write out the convolutional kernel matrix.

1 1 1

0 0 0

-1 -1 -1

This filter is used to check the changes in intensity between top and bottom pixels.

3. Describe the mathematical operation that a 3x3 kernel performs on a single pixel in an image.

Ans: it performs element wise multiplication.

4. What is the significance of a convolutional kernel added to a 3x3 matrix of zeroes?

Ans: it is similar to applying a filter onto an image having pixels with 0 value. So technically there would not be any feature extracted out of this image.

5. What exactly is padding?

Ans: Padding is used to avoid information loss occurred due to filtering. It is applied before filtering in CNN

6. What is the concept of stride?

Ans: stride is the number of steps the filter matrix moves. Stride=1 means horizontal filter matrix moves 1 step to the right after element wise multiplication.

7. What are the shapes of PyTorch's 2D convolution's input and weight parameters?

Ans: input tensor has the following parameters:

(batch\_size, in\_channels, height, width)

The weight parameters are below:

(out\_channels, in\_channels, kernel\_height, kernel\_width)

8. What exactly is a channel?

Ans: Channel parameter is used to represent if an image is black and white or colored.

For black and white it is 1 and for RGB it is 3.

9.Explain relationship between matrix multiplication and a convolution?

Ans: Convlution is a type of matrix multiplication where we perform element wise multiplication.