Part C

1. (a) (2 points) Consider an input image of shape $200 \times 200 \times 3$. You flatten this image and use a fully connected layer with 100 hidden units. What are the shapes of the weight matrix and the bias vector of this layer?

   (b) (2 points) You run the same image ($200 \times 200 \times 3$), this time unflattened, in a convolutional layer with 10 filters, of kernel size 4×4 with stride 1 and padding 1. Assuming no bias parameters, how many learnable parameters does this layer have and what will be the shape of the activation map after the convolution operation? Provide your activation map shape in the format height×width×channels.

   (c) (1 point) What is the number of computations (considering multiplication operations only) for the above convolution operation?

   (d) (2 points)A max-pooling kernel of size 2×2 with stride 2 is passed over the activation map obtained in part (b). How many learnable parameters does this layer have and what will be the shape of the output activation map after the pooling operation?