A) Answer the following questions:

1. **Define:**
   a. **Spatial filtering**
   b. **Frequency domain filtering**
   c. **Convolution and correlation**
   d. **Color images.**
   e. **Indexed image**

2. **Make a comparison between:**
   a. **NTSC and YCrCb color spaces.**
   b. **CMYK and HSV color spaces.**
   c. **Linear and non-linear filtering.**
   d. **Low-pass and high-pass filters.**

B) Write MATLAB scripts that do the following tasks [use any popular image, tire, pout, cameraman, ...etc]:

1. **Using the definition of ideal low-pass and high-pass filters in frequency domain, make a comparison between different D_0 values on a color image.**
2. **Using the definition of Butterworth low-pass and high-pass filters in frequency domain, make a comparison between different D_0 and n values on a color image.**
3. **Using the definition of Gaussian low-pass and high-pass filters in frequency domain, make a comparison between different D_0 values on a color image.**
4. **Make a comparison between Ideal, Butterworth, and Gaussian filters. Please comments on your figures.**
5. **Matlab support different methods for edge detection such as Sobel, Prewitt, Roberts, log, zerocross, and Canny. Please define their 3x3 operators and then build a comparison between them.**
6. **Following B.5, demonstrate that there are no differences on the results when using spatial or frequency domain filtering.**

~~Enjoy~~