Question 1: Seam Carving [40 Marks]

Problem Statement:

Apply seam carving content-aware image-resizing algorithm on a given image. Take the height and width (in pixels) of the output image as inputs from the user.

What is Seam Carving?

- Seam-carving is a content-aware image resizing technique where the image is reduced in size by one pixel of height (or width) at a time.
- A vertical seam in an image is a path of pixels connected from the top to the bottom with one pixel in each row.
- A horizontal seam is a path of pixels connected from the left to the right with one pixel in each column.

Steps:

- **Energy Calculation**: Each pixel has some RGB values. Calculate energy for each pixel. For example, you can use a dual-gradient energy function, but you are free to use any energy function of your choice. Refer to `https://en.wikipedia.org/wiki/Seam_carving` for details.
- **Seam Identification**: Identify the lowest energy seam.
- **Seam Removal**: Remove the lowest energy seam.

Figure 1: Original image before seam carving.

Program Flow:

1. Extract individual pixel's RGB values from the sample image. Load the RGB values in a 3D matrix (Height $\times$ Width $\times$ 3).
2. Apply seam carving algorithm.
3. Generate sample image output using the RGB values for resized image (New_Height $\times$ New_Width $\times$ 3).