Task # 1
Computer Vision

Tasks:

1. Take two random images, one having the red color like North Korea's flag and the other image with a blue shade.
2. Split both the images into red, green, and blue single channels.
3. For both images integrate combinations of two different channels into an image.
4. Swap the red channel with the blue channel.
5. Write a report after performing the above tasks.

Solution:

Code:

```python
import cv2

img_path = "resources/blue.jpg"                    # saving image path
img = cv2.imread(img_path)                          # reading the image in img variable
img = cv2.resize(img, (550, 309))                   # resizing the image in img variable

b, g, r = cv2.split(img)                            # splitting the colored image into
red, green and blue channels
cv2.imshow("Red Channel", r)                        # displaying red channel
cv2.imshow("Green Channel", g)                      # displaying green channel
cv2.imshow("Blue Channel", b)                       # displaying blue channel

img_merge = cv2.merge([b, g, r])                    # merging the red, green and blue
channels into a colored image
cv2.imshow("Merged Image", img_merge)               # displaying the colored image

img_swapped = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)  # swapping red and blue color
cv2.imshow("Swapped Image", img_swapped)            # displaying the colored image

cv2.waitKey(0)                                      # adding wait of 10 seconds
cv2.destroyAllWindows()                             # closing all the opened windows
```
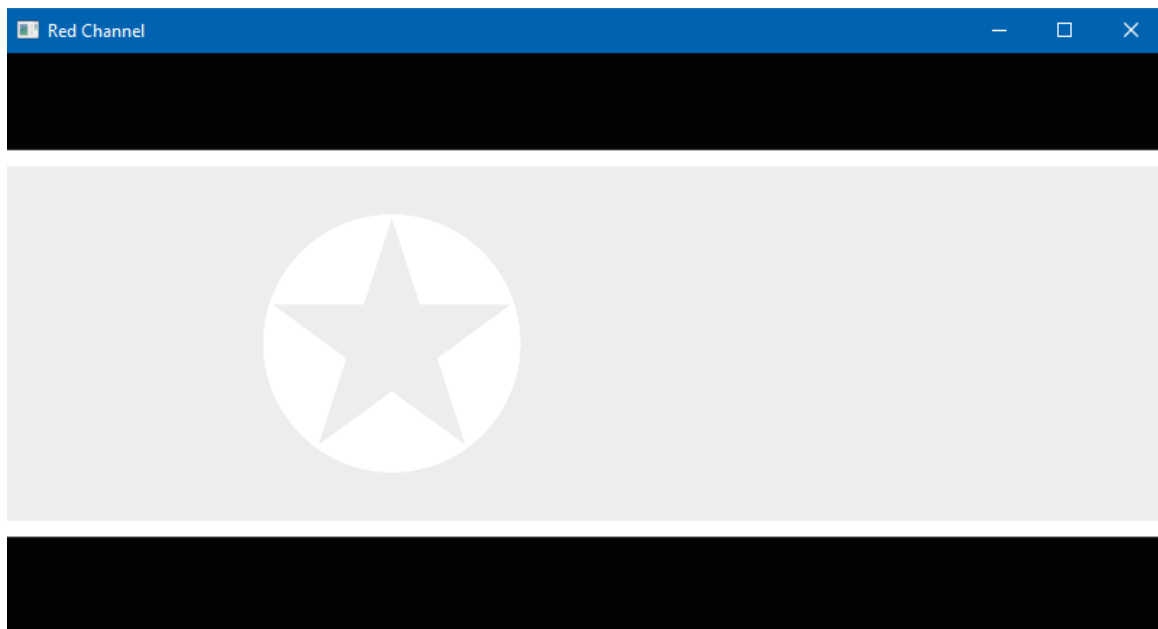
Image one:

Red channel:

Green channel:

Green Channel

Blue channel:

Blue Channel

All channels merged:

Red and blue channel swapped:

Image two:
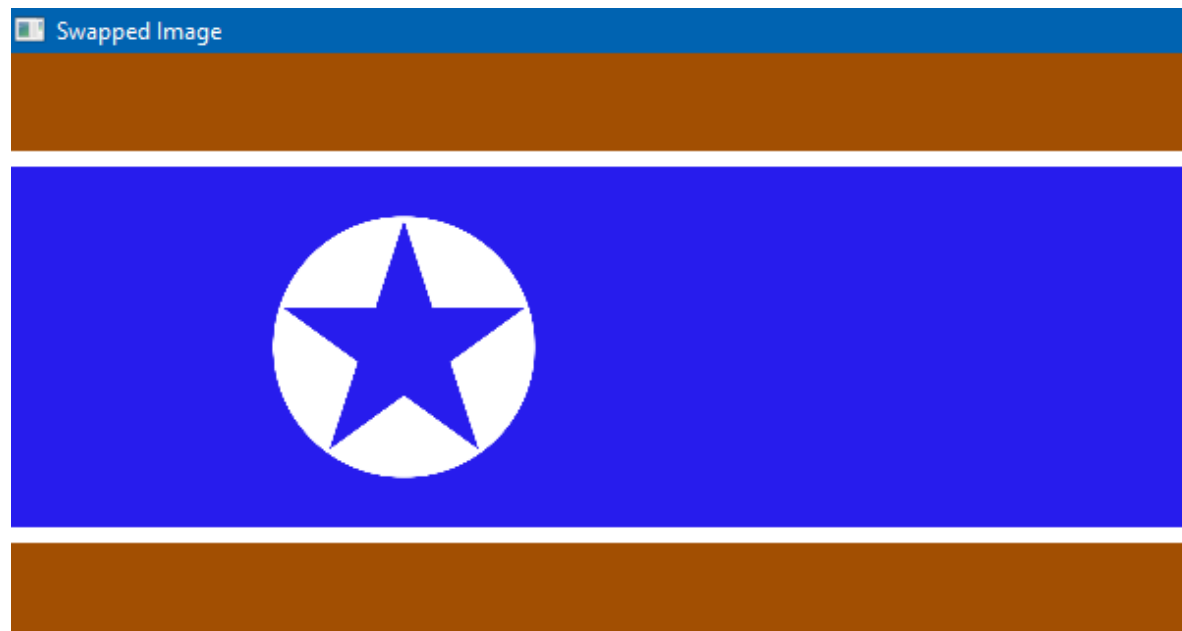
Red channel:

Green channel:

Green Channel

Blue channel:

Blue Channel

All channels merged:

Red and blue channel swapped:

Conclusion:
The colored image is made up of a 3-D matrix where there are three 2-D matrices. Each 2-D matrix represents a single channel which is either red, green, or blue. In each of these matrices, the number of rows and columns is the resolution of the image and at each index in this matrix, there is a number from 0-255 that represents the intensity of this channel. All three channels have the same resolution. If we swap two channels it means that we have exchanged the values of matrices of the two channels. We can split the image into these channels using functions of OpenCV and we can also merge these three channels into a colored image.