

● 原始圖片



先將圖片轉成 array:

```
lena = Image.open("lena.bmp")  
array=np.array(lena)
```

● 第一部分

(a) upside-down

```
def up_side_down(array):  
    up_side_down=[]  
    for i in range(len(array)-1,-1,-1):  
        up_side_down.append(array[i])  
    up_side_down=np.array(up_side_down)  
    up_side_down = Image.fromarray(up_side_down)  
    return up_side_down
```

(b) right-side-left

```
def right_side_left(array):  
    right_side_left=[]  
    for i in range(len(array)):  
        right_side_left.append([])  
        for j in range(len(array)-1,-1,-1):  
            right_side_left[i].append(array[i][j])  
    right_side_left=np.array(right_side_left)  
    right_side_left = Image.fromarray(right_side_left)  
    return right_side_left
```

(c) diagonally mirrored

```
def diagonally_mirrored(array):
    output=[]
    diagonally_mirrored=np.array(right_side_left(array))
    for i in range(len(diagonally_mirrored)-1,-1,-1):
        output.append(diagonally_mirrored[:,i])
    output=np.array(output)
    output = Image.fromarray(output)
    return output
```



● 第二部分



