In [2]:
```
import numpy as np #importing library
```

In [3]:
```
import matplotlib as plt # data vizualisation
import matplotlib.pyplot as plt
```

In [4]:
```
from PIL import Image # python image library
```

In [5]:
```
velma_img = Image.open(r"C:\Users\mohap\Downloads\VelmaI.jpg")
velma_img
```

Out[5]:

In [6]:
```
type(velma_img)
```

Out[6]:
```
PIL.JpegImagePlugin.JpegImageFile
```

In [7]:
```
velma_arr = np.asarray(velma_img)
```

In [8]:
```
velma_arr
```

Out[8]:
```
array([[[230, 206,  38],
        [230, 206,  38],
        [230, 206,  38],
        ...,
        [231, 207,  45],
        [231, 207,  45],
        [231, 207,  45]],

       [[230, 206,  38],
        [230, 206,  38],
        [230, 206,  38],
        ...,
        [231, 207,  45],
        [231, 207,  45],
        [231, 207,  45]],

       [[230, 206,  38],
        [230, 206,  38],
        [230, 206,  38],
        ...,
        [231, 207,  45],
        [231, 207,  45],
        [231, 207,  45]],

       ...,

       [[ 21,  78,  95],
        [ 22,  79,  96],
        [ 23,  80,  97],
        ...,
        [195, 189,  79],
        [188, 186,  75],
        [183, 183,  71]],

       [[ 23,  85,  98],
        [ 24,  86,  99],
        [ 24,  87, 102],
        ...,
        [182, 180,  69],
        [176, 178,  68],
        [172, 179,  67]],

       [[ 27,  91, 101],
        [ 28,  92, 102],
        [ 28,  94, 108],
        ...,
        [176, 176,  64],
        [173, 180,  68],
        [174, 182,  70]]], dtype=uint8)
```

In [10]:
```
type(velma_arr)
```

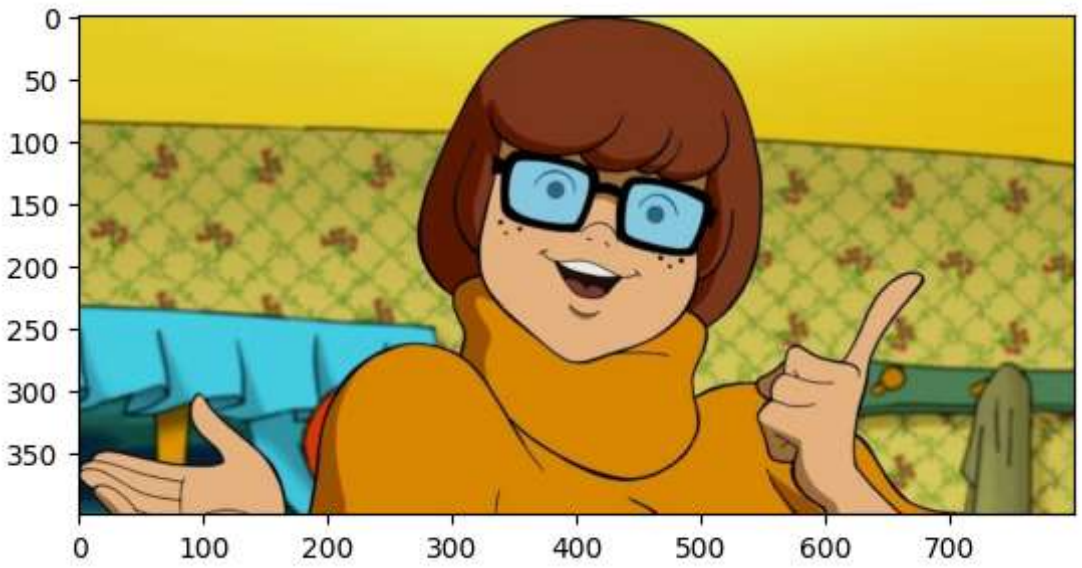
Out[10]:
```
numpy.ndarray
```

In [11]:
```
velma_arr.shape  # shape of image
```

Out[11]:
```
(400, 800, 3)
```

In [12]:
```
plt.imshow(velma_arr)
```

Out[12]: <matplotlib.image.AxesImage at 0x23e8e8a6d80>



In [15]:
```
velma_red = velma_arr.copy()
```

In [22]:
```
velma_red
```

Out[22]:
```
array([[[230, 206,  38],
        [230, 206,  38],
        [230, 206,  38],
        ...,
        [231, 207,  45],
        [231, 207,  45],
        [231, 207,  45]],

       [[230, 206,  38],
        [230, 206,  38],
        [230, 206,  38],
        ...,
        [231, 207,  45],
        [231, 207,  45],
        [231, 207,  45]],

       [[230, 206,  38],
        [230, 206,  38],
        [230, 206,  38],
        ...,
        [231, 207,  45],
        [231, 207,  45],
        [231, 207,  45]],

       ...,

       [[ 21,  78,  95],
        [ 22,  79,  96],
        [ 23,  80,  97],
        ...,
        [195, 189,  79],
        [188, 186,  75],
        [183, 183,  71]],

       [[ 23,  85,  98],
        [ 24,  86,  99],
        [ 24,  87, 102],
        ...,
        [182, 180,  69],
        [176, 178,  68],
        [172, 179,  67]],

       [[ 27,  91, 101],
        [ 28,  92, 102],
        [ 28,  94, 108],
        ...,
        [176, 176,  64],
        [173, 180,  68],
        [174, 182,  70]]], dtype=uint8)
```

In [26]:
```
velma_arr  == velma_red
```

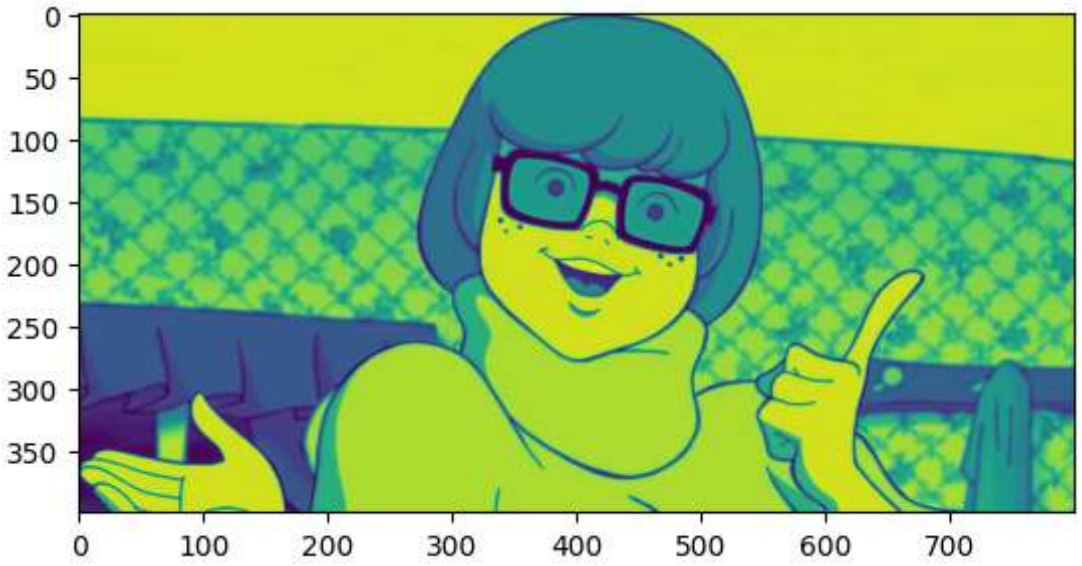
Out[26]:
```
array([[[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       ...,

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]]])
```

In [28]:
```
velma_red.shape
```

Out[28]:
```
(400, 800, 3)
```

In [30]:
```
plt.imshow(velma_red[:,:,0]) #R  G B
```

Out[30]:
```
<matplotlib.image.AxesImage at 0x23e8e886390>
```

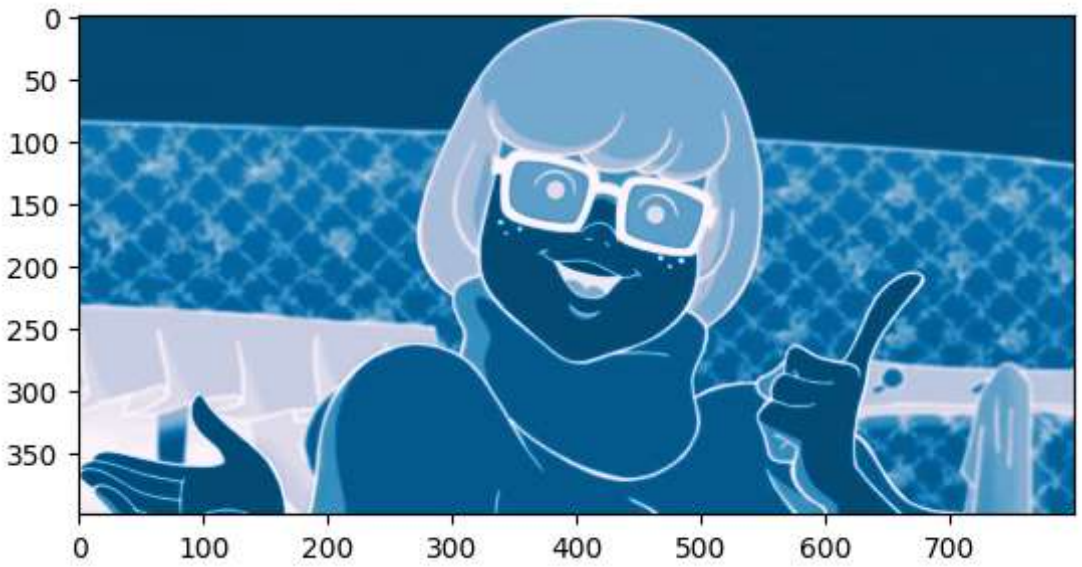


In [32]:
```
velma_red[:,:,0]
```

Out[32]:
```
array([[230, 230, 230, ..., 231, 231, 231],
       [230, 230, 230, ..., 231, 231, 231],
       [230, 230, 230, ..., 231, 231, 231],
       ...,
       [ 21,  22,  23, ..., 195, 188, 183],
       [ 23,  24,  24, ..., 182, 176, 172],
       [ 27,  28,  28, ..., 176, 173, 174]], dtype=uint8)
```

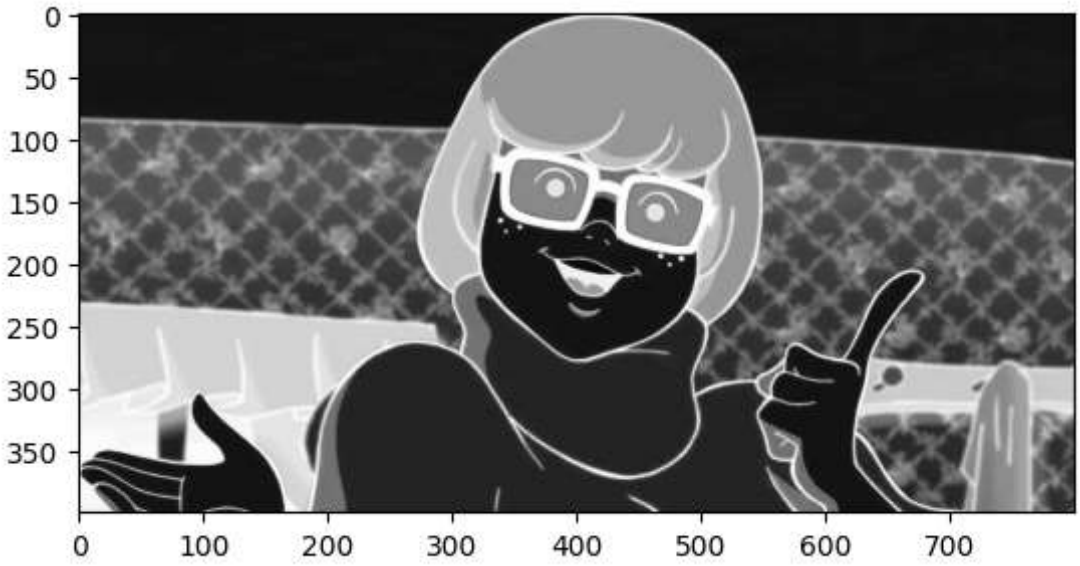
In [34]:
```
plt.imshow(velma_red[:,:,0],cmap = 'PuBu')
```

Out[34]:
```
<matplotlib.image.AxesImage at 0x23e8e807dd0>
```



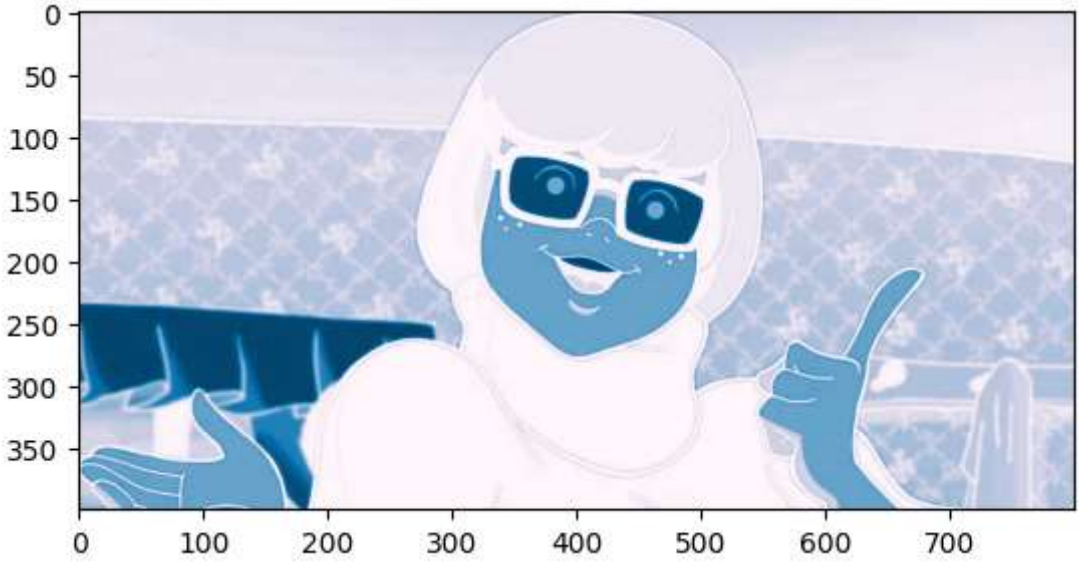
In [36]:
```
plt.imshow(velma_red[:,:,0],cmap = 'Greys')
```

Out[36]:
```
<matplotlib.image.AxesImage at 0x23e91cdbce0>
```



In [38]:
```
plt.imshow(velma_red[:,:,2],cmap = 'PuBu')
```

Out[38]:
```
<matplotlib.image.AxesImage at 0x23e91cda870>
```



In [40]:
```
velma_red[:,:,0]
```

Out[40]:
```
array([[230, 230, 230, ..., 231, 231, 231],
       [230, 230, 230, ..., 231, 231, 231],
       [230, 230, 230, ..., 231, 231, 231],
       ...,
       [ 21,  22,  23, ..., 195, 188, 183],
       [ 23,  24,  24, ..., 182, 176, 172],
       [ 27,  28,  28, ..., 176, 173, 174]], dtype=uint8)
```

In [42]:
```
velma_red[:,:,2]
```

Out[42]:
```
array([[ 38,  38,  38, ...,  45,  45,  45],
       [ 38,  38,  38, ...,  45,  45,  45],
       [ 38,  38,  38, ...,  45,  45,  45],
       ...,
       [ 95,  96,  97, ...,  79,  75,  71],
       [ 98,  99, 102, ...,  69,  68,  67],
       [101, 102, 108, ...,  64,  68,  70]], dtype=uint8)
```

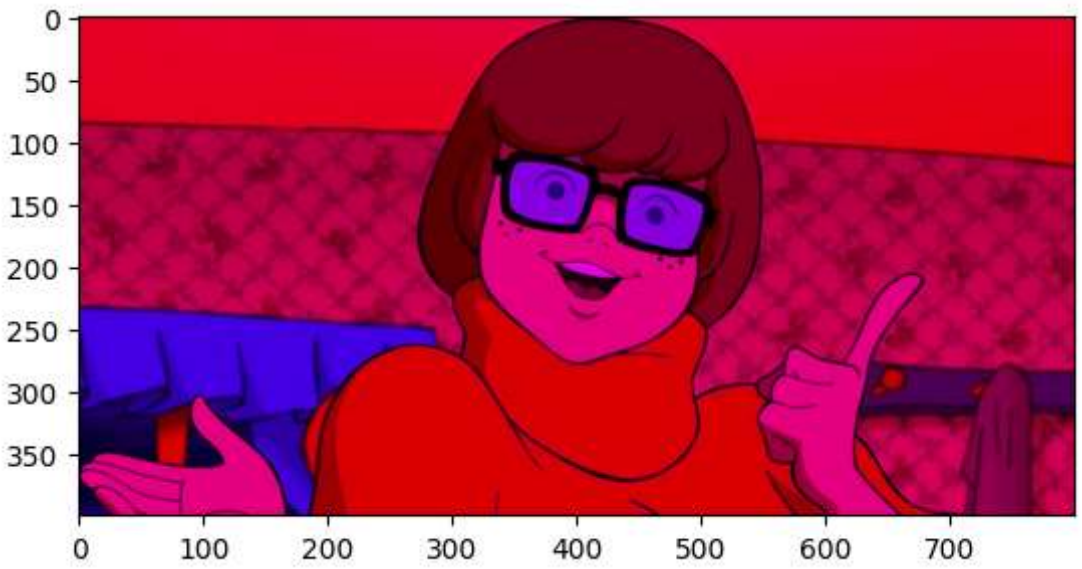
In [44]:
```
velma_red[:,:,1] = 0
```

In [46]:
```
velma_red[:,:,1]
```

Out[46]:
```
array([[0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       ...,
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0]], dtype=uint8)
```

In [48]:
```
plt.imshow(velma_red)
```

Out[48]:
```
<matplotlib.image.AxesImage at 0x23e91d5eb70>
```



In [ ]:
```
@https://matplotlib.org/stable/gallery/color/colormap_reference.html
```

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]: