Colors

- Monochrome - 2 colors
- RGB scheme for monitors - additive primaries
- CMY scheme for hardcopy - subtractive primaries

Schemes for reducing numbers of colors/grayscale

- Gray scale - various intensities of white (closer to color than monochrome)
  - higher resolution (used in spy satellites)

- Want to make pixels small (.39 mm → .28 mm std)

- Halftone - newspapers
  - series of black dots varying in size

How to print a color image using a B/W printer?

- Threshold value - above → black, below → white
- Dithering - ordered dither - trade resolution for intensities

  - Turn 4 pixels into 1:

```
  1  1  1
  1  1  1
  0  0  0
```

- What if image is one pixel wide? (e.g. fonts)
  - Small details get cut to pieces

  - Dithering patterns are square
  - 10 colors → 3x3 and all 0s

```
  0  0  0
  0  0  0
  0  0  0
```

- Worse mutilation
  - Color image → B/W printer or to reduce # of colors

- Not employed going from 3 byte color to 1 byte (round to closest)

How about going to 2-bit color? (only 2 colors at a time)

```
  0 0  1 1  0 1  1 1  1 1  0 0  0 0
  0 0  0 0  2 2  2 2  2 2  0 0  0 0
```

- Test question

```
  3 2  3 2  3 2  3 2
  2 3  2 3  2 3  2 3
```

- Add up all colors, divide by # pixels → use these as thresholds.