LECTURE 3

- **Digitizing: converting Analog to Digital**
  Step 1: *Sampling*- how many parts (pixels) will I break the image up to?

- Step 2: Quantizing- how many discrete values(bits) will I use to rep. each
  pixel
  _ represents the colour combinations
  _ use binary measurement scale; 0,1=2^1,
  00, 01, 10, 11= 2^2

Colour Models

- Used for Web
  _Additive Model (RGB):
    _Primary colours: red, blue, green
  _ Subtractive Model (CMYK)
    _Cyan, magenta, yellow
    _ uses Printing ink- when applied to paper removes ("subtracted") from a
  white background
    _commerical print is built on CMYK plates & inks

1) *RGB code*
  _each pixel is represented by 3 values
   each value ranges from 0-255
2) *Hexadecimal code*
  _ allowable symbols: 0,1,2,3,4,5,6,7,8,9, A,B,C,D,E, & F (FF means 255)
    #FF0000 → Red
    #00FF00 → Green
    #0000FF → Blue
    #000000 → Black
    #FFFFFF → White

_you CAN convert from RGB←→ Hexadecimal , RGB=<66,00,99> , Hexa=#660099

Graphics:

- graphics are categorized as being either: Bitmap or Vector
- affects how graphics are displayed on a computer screen in terms of:
    1) quality
    2) file size
    3) Time to display graphics

_Bitmaps Graphics (raster) :
- bitmapped images are made up of small squared called **pixels**

- bitmapped images come from: scanners, cameras, etc
- if image <u>resized</u> (resampling) not zooming
  _ computer adds new pixels & guesses on colours for the new pixels (interpolation) based on surrounding pixels
  _ square becomes larger, edges more jagged
  _quality decreases
  _file size increases

_advantages of small image on web: shorter time needed to display on screen, since file is smaller
_from larger to smaller→ no distortion

Dimensions: 400 x 400
Image Size: 98k

_Vector Graphics

- mage represented with lines and arcs that a mathematical relationship
  _describing the drawing of the shape
- to draw a:
  Line- starting point, direction, length
  Rectangle: start point, width, height
  Circle: center and radius
- doesn't matter what size the image is!
- As image is <u>resized</u>, larger ←→ smaller
  _edges clean, crisp
  _no distortion going up/down in size
  _ quality is maintained
  _ file size increases (if resized larger)

_advantage: ideal for producing artwork which frequently needs to be presented in different sizes and colours
_vector base can be logos

Dimensions:
400 x 400
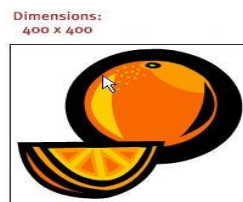
why d we need different graphics software?
Bitmapped- Based:
- Images from- scanner, cameras, etc

- Ability to edit an image's pixels
- Need a "Paint" program
- Photoshop, Paintshop Pro, photoPlus, Corel PhotoPaint, Fireworks
- Photoshop v6.0- has vector feature as well
- Common bitmap file formats: .jpg, .gif, .tiff, &.bmp

Remember:
Vector→Bitmap= YES (bring into Paint program and convert to bitmap)
Bitmap →Vectore= NO (once a bitmap, always a STUPID bitmap)

Vectore –Based:
- Suitable for drawing that wil be sized often
- Greater control and precision with free- hand tool
- Display more accurately on screen/ paper/ billboards
  (can be redrawn with accuracy without loss of quality)
- Download faster because of .svg format
       (less info recorded smaller file)
- Must use a "Draw" program- draw & edit paths
- Adobe illustrator or Macromedia FreeHand, corel Draw
- Common formats: .esp, .cdr (CorelDraw), .dwg (Autocad)

Reminder:
Vector- based is smaller file, recording a mathematical relationship

Image Resolution:
- # of pixels per square inch
- For web: set to 72 ppi
- For printing: set to 300 ppi or more

If Resolution	Each pixel size	# of pixels per inch
100 ppi	1/100th inch	100 x100
300 ppi	1/300th inch	300 x 300
6 ppi	1/6th inch	6 x 6
3 ppi	1/3th inch	3 x 3

Image Bit Depth: (aka Colour Depth)
- Refers to # of bits used to represebt a colour of a pixel (ie 1 bit, 2 bits, 3 bits, etc)
- 1 bit= 2 colours

Graphics Software:

- *Illustration Program* (aka DRAWING PROGRAM)
  _vector- based drawing programs allows more flexibility when creating artwork that's to be resized or must go through multiple edits
  _logos, for example, should be created in illustration programs
  _eg: Adobe Illustrator, CorelDraw, Macromedia Freehand

Photo/image Editor (aka Paint Programs)
_ bitmap graphics tools are needed for working with photos, scans, or other "realistic" images
_superior for final output of images for Web or for many special effects to photos

Questions:
1) how many things can be presented with 5 bit depth? *32= 2^5*
2) whats the smallest value that should set the dpi for an image that you plan to print? 300
3) 2 things to do when converting Analog to Digital*? 1) sampling (how many pieces) & 2) quantizing (bit depth)*
4) what bit depth do you need to represent a black & white image? *1 bit depth*

Questions:
white→ # FFFFFF	dark gray → (14,14,14)
bright green → #00FF00	medium grey → (125, 125, 125)
bright blue → #FAFAFA	
light gray → (0,0,255)	
Black→ (0,0,0)	