Kickstart 2012
Day 1 Part 2
Picture Manipulation
Pictures

- An encoding that represents an image
  - height and width
  - filename
  - Containing window if it’s opened

```python
>>> pic = makePicture(myFile)
>>> print pic
Picture, filename
/Users/guzdial/mediasources/barbara.jpg height 294 width 222
```
Pixels

- Pictures are a bunch of little dots = pixel
  - color
  - Location (graph like format)

**Methods**

getPixel(picture, x, y) - retrieves a single pixel: more later

getPixels(picture) - gets *all* of them in a list

**Example**

```python
>>> pixels=getPixels(pic)
>>> print pixels[0]
Pixel, color=color r=168 g=131 b=105
```
Colors: RGB

- In RGB, each color has three component colors:
  - Redness
  - Greenness
  - Blueness

- 0-255
Pixel Methods

GETTERS

• Pixels
  • getRed(px)  getBlue(px)  getGreen(px)

• Colors
  • getColor(px)

SETTERS

• Pixels
  • setRed(px, val)  setBlue(px, val)  ...

• Color
  • setColor(px, col)
We can change pixels directly…

```python
>>> pict = makePicture(file)
>>> pix = getPixel(pict, 10, 100)
>>> setColor(pix, yellow)
>>> repaint(pict)
```

But that’s really dull and boring to change each pixel at a time… Isn’t there a better way?
How to change the entire picture!

def decreaseRed(picture):
    decreases the red in all the pixels of a picture
Decreasing the red in a picture

**Recipe:** To decrease the red

**Ingredients:** One picture, name it **pict**

**Step 1:** Get all the pixels of **pict**. For each pixel **p** in the set of pixels...

**Step 2:** Get the value of the red of pixel **p**, and set it to 50% of its original value.
How to change the entire picture!
For loops!

def decreaseRed(picture):
    for each pixel in the picture
        get the red value of that pixel
        set the red value of that pixel to half the original
For loops

```python
def decreaseRed(pict):
    allPixels = getPixels(pict)

    for pix in allPixels:
        value = getRed(pix)
        setRed(pix, value * 0.5)
```

- Note the indentation!