* Computation of Entropy ( A measure of variation)
  + Let X be a random process such as the grey levels of an image, we define the entropy of X as follows:
    - E(X) = sum(-pi\*log2[pi]) for all Xi belongs to X
    - Where P is the pdf of x
    - P will be represented in a column vector, same with the corresponding log[p]
    - -P.\*logp = [-p0logp0, -p1logp1, …, -p255logp255] (another column vector)
    - Matlab example:
      * Entropy = sum(-p.\*log(p))
      * Entk = 7.6619 for jenna.jpg (See Lecture #2)
* HOMEWORK #1 (6 problems, Due 9/3 at midnight on blackboard):
  + Problem 1 assigned in lecture 1
  + Textbook: Pages 123-129
    - 2.11
    - 2.14
    - 2.15
    - 2.24
    - 2.26
* Chapter 3: Gray Scale Transformation
  + Goal: improve the perception of an image aka image enhancement
  + f and g are both images
  + where g = T(f) and T is a 1-1 function that maps grey levels of f to be the grey levels of g
  + Steps:
    - Normalize the grey levels of input image f to be between 0 and 1.
      * 0 is an expression of dark values
      * 1 is an expression of bright values
      * fnorm = (f – min(f)) / (max(f) – min(f))
      * matlab has a normalization function: mat2gray()
      * The histograms will be the same but the range of the x axis will change from 0-256 to 0-1.
    - Apply a transform function T in order to obtain output image g
  + Examples of gray scale transformations:
    - Explicit transformations
      * Negative image
        + T(X) = 1-X where X is a normalized gray level
        + See class notes for drawing.
      * Polynomial transformation
        + T(X) = X^n

If n is greater than 1, it makes the image darker

if n is less than 1, it makes the image brighter

* + - * + See class notes for drawing
      * Histogram Equalization
        + Recall: Transformation of random variables
        + Given X ~ pdf(X) and a transform Y = T(X), where T is a 1-1 transform function. What is the pdf of Y?
    - Special random variable transformations
      * If X ~ uniformly distributed (0,1)
        + Pdf is a box between 0 and 1
        + T(X) = -ln(x) produces an exponential distribution

i.e. Y = -ln(X) has p(y) = e^-y

See class notes for drawing

* + - * Transofrm of any random variable X to be uniform is the cumulative distribution of X
        + If you have a random variable X with pdf P,
      * Ex. X ~ exponential with mean = m
        + P(X) = 1/m e^(-X/M); x > 0
        + cdf: P(X) = integral(p(y)dy) from –inf to x
        + SEE CLASS NOTES FOR SKETCHES OF PDF AND CDF
        + Standard normal (mean = 0, std = 1): P(X) = (1/(root(2)\* pi)) \* e^-((X^2)/2)
        + Lower case p is the probability density function, upper case P is the cumulative distribution function