1. For a random variable X with standard deviation, find the largest probability (the upper bound) that the value of the random variable is smaller than its mean by standard deviations or larger than the mean by the same value.
2. a. Find the mean number of heads in three coin tosses. The coin is biased towards getting tail where the probability to get a tail is 0.8.

b. If the number of tosses is 100, what is the mean number of heads?

1. Proof that:
   1. VAR(*cX*)=*c*2VAR(*X*)
   2. VAR(*X+c*)=VAR(*X*)

Where *X* is a random variable, *c* is a constant and VAR means the variance.

1. Consider the random variable X with the probability density function given by
   1. Find the moment generation function. (show your work)
   2. Find the mean and the variance using the moment generation function. (show your work)
2. If we would like to construct a random variable Y by the transformation T(x) from another random variable X given by , find the probability density function of Y if
   1. X is a uniform random variable with the density function
   2. X is a Gaussian random variable with zero mean and unit variance.
3. If X is a Gaussian random variable with mean= and variance=, what is the mean and variance of Y, where .