Lecture 3 Normal distribution, stem-leaf, histogram

- Idealized Population, Box of infinitely many tickets, each ticket has a value.
- Random variable and probability statement $P(X<85)$
- Notations , Greek letters: Mean (expected value) and standard deviation, $E(X) = \mu$, $SD(X) = \sigma$, $Var(X) = \sigma^2$
- Examples
- Empirical distribution : Stem-leaf, histogram
- Three variants of histogram : frequency, relative frequency, density(called “standardized” in book)
- Same shape with different vertical scale
- Density= relative frequency / length of interval

- Given a box of tickets with values that come from a normal distribution with mean 75 and standard deviation 15, what is the probability that a randomly selected ticket will have a value less than 85?

- Let X be the number elected (a random variable).
- Pr(X<85).

How does the normal table work?

- Start from Z=0.0 , then Z=0.1
- Increasing pattern observed
- On the negative side of Z
- Use symmetry

How to standardize?

- Find the mean
- Find the standard deviation
- Z= (X-mean)/SD

- Reverse questions:
- How to recover X from Z?
- How to recover X from percentile?

- Suppose there are 20 percent students failing the exam
- What is the passing grade?
- Go from percentage to Z, using normal table
- Convert Z into X, using X=mean + Z times SD

Probability for an interval

- P (60<X<85)

- Draw the curve (locate mean, and endpoints of interval)

- =P(X<85)-P(X<60) where
- P(X<60)= P(Z<(60-75)/15)=P(Z<-1)=1-P(Z<1)=1-.841= about .16