Stat 280 Oc tober 15, 2001

Midterm is Wed Nov 7.

Assignment for October 24, 2001

Ch 5: 5.2-4, 5.3-6, 5.4-2, 5.4-10
Ch 6: 6.1-8, 6.2-8, 6.3-4, 6.4-4, 6.5-6, 6.6-4.

Read Ch 5 and Ch 6 (and the www notes as well)

Today: Ch 5 topics: review of
- density (pdf) and cumulative dist (cdf) (5.1)
- expected value (5.2)
- distribution of function of a RV (5.2)
- simulating distribution with known cdf (5.3)
- joint distributions (5.4)

Exercise 5.1-5

F(x)=1-$e^{-.2\times x}$ for x>0

a) P(5<X<10) = F(10)-F(5) =1-$e^{-.2\times 10}$- (1-$e^{-.2\times 5}$) =e^{-1}- e^{-2}= .23
b) P(X>10)= 1-P(X<10)= e^{-2}= .135
c) .2$e^{-.2\times x}$ x>0

Exercise 5.2-7

X ~ U(0,1) and Y=-ln(X). pdf of Y?

P(X<x) = x for 0<x<1. P(Y<y) = P(-ln(X)<y)= P(ln(X) > -y) = P(X>e^{-y})=1-e^{-y}

So Y is exponential with mean 1 and pdf is e^{-y}.

Or, Use p 207:

g(y) = 1. $\left|\frac{dx}{dy}\right|$ But since y=-ln(x), x=e^{-y} and $\frac{dx}{dy}$ = -e^{-y} so g(y) = e^{-y}

Expected value:

Suppose	X	P(X=x)
	1	.3
	2	.5
	3	.2

The Expected Value of X is just the mean in the population:
E(X) = 1*.3 + 2*.5 + 3*.2=1.9

$$E(X) = \sum_x xP(X = x)$$

What if P(X=x) is approx = f(x) Δx …..where f(x) is pdf

Then, $E(X) = \int_x xf(x)dx$

Simulating X:

Recall that is X is a rv with cdf $F_X(x)$, then $F_X(X)$ ~ U(0,1)

So if we are given $F_X(x)$, we can use it to simulate X.

To simulate 100 random values of X ….

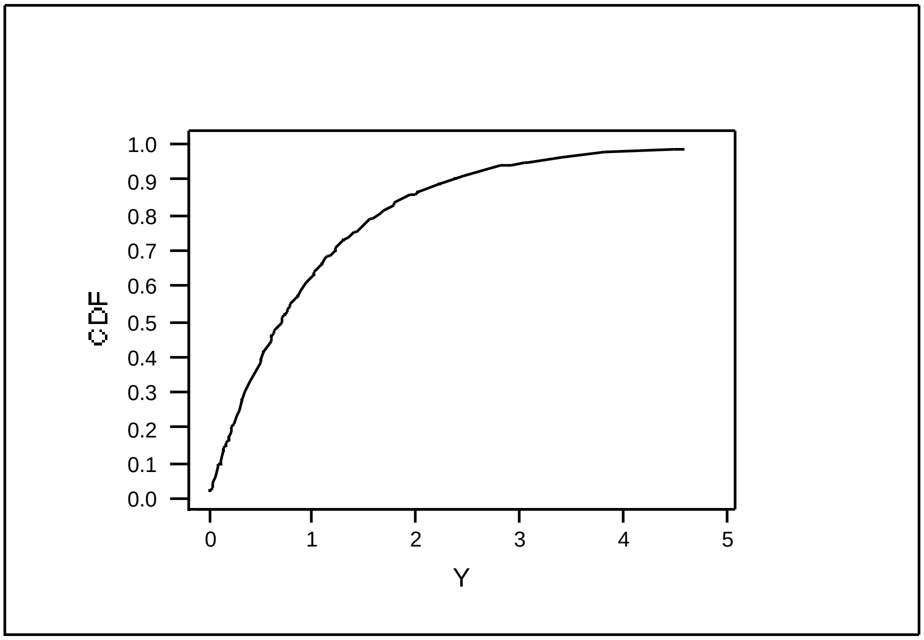
Method: Generate a sample of size 100 from the U(0,1) distribution.

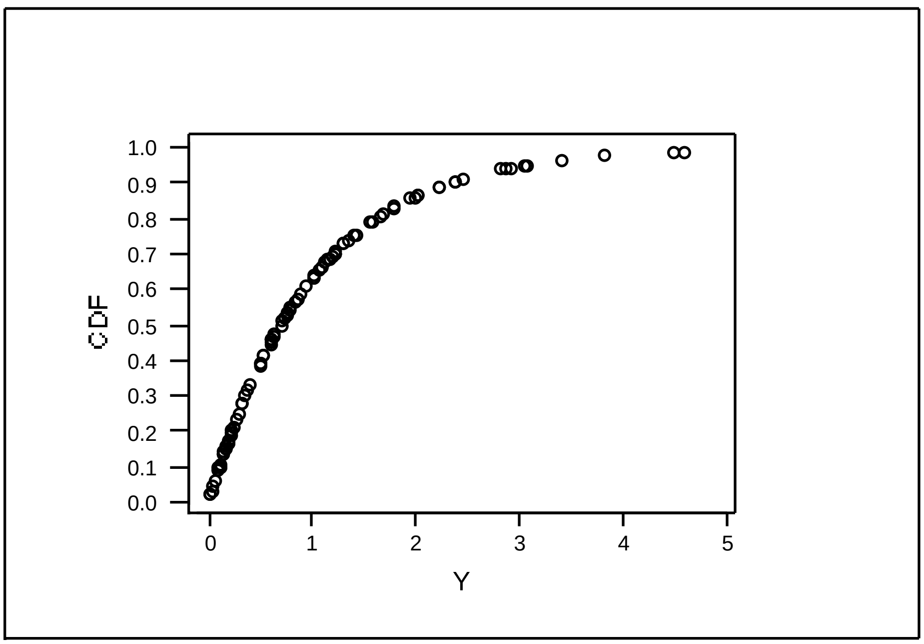
```
MTB > rand 100 c1;
SUBC> uniform 0 1.
MTB > dotp c1
```

Character Dotplot

```
          .  .              .           .
      .  : ::.            :  .. .  ...:    .  : : ...
```

```
 :.. : ::::: .:.:  .::.:.:::.: .:::::.: :.:: :.:::
+---------+---------+---------+---------+---------+-------C1
0.00      0.20      0.40      0.60      0.80      1.00
```





MTB > dotp c2

Character Dotplot

```
   :
  .:
  ::   .
  ::  .:.   .:
::::.:::::.::.      .
:::::::::::::: :::.: : :.  .: :  .   .      ..
+---------+---------+---------+---------+---------+-------C2
0.0       1.0       2.0       3.0       4.0       5.0
```

How to do the cdf inversion in MINITAB?

I’ll send you a program.

Joint Probabilility Distributions:

I gave an example of a discrete joint distribution and discussed the
Relationship between the joint and conditional distributions associated with the example.
This was a preamble to discussing joint and conditional distributions of continuous rvs.