

```

rm(list = ls())

par(mfrow=c(2,2))

theta<- seq(.01,.3,by=.001)

# Plot 1 x=5

like<- dbinom(5,100,theta)
like2<- like/max(like)

text(.055,.4,'x=5',cex=.8)

plot(c(0,.3),range(c(like2)),type='n',xlab=expression(theta),ylab='Likelihood')
lines(theta,like2)
text(.055,.4,'x=5',cex=.8)
lines(theta,like2,lty='dotted',lwd=1.5)

##Loop to find argmax
Mxinit=dbinom(5,100,theta[1])
Mx=0
argmx=0
for(i in 1:length(theta))
{
  Mx=dbinom(5,100,theta[i])
  if (Mx > Mxinit)
  {
    Mxinit=Mx
    argmx=theta[i]
  }
}

#END ARGMX loop
J=paste("The likelihood ratio is ",round(Mxinit/max(like),2)," at ",round(argmx,2), sep="")
title(J)

# Plot 2 Biomial x<11

like <- pbinom(10,100,theta)
like1<- like/max(like)

plot(c(0,.3),range(c(like1)),type='n',
      xlab=expression(theta),
      ylab='Likelihood')

lines(theta,like1)

text(.15,.4,'x<11',cex=.8)

##Loop to find argmax
Mxinit=pbinom(10,100,theta[1])
Mx=0
argmx=0
for(i in 1:length(theta))
{
  Mx=pbinom(10,100,theta[i])
  if (Mx > Mxinit)
  {
    Mxinit=Mx
    argmx=theta[i]
  }
}

#END ARGMX loop
J=paste("The likelihood ratio is ",round(Mxinit/max(like),2)," at ",argmx, sep="")
title(J)

```

```
#Plot 3 Normal x bar= 2.5
```

```
theta <- seq(-1,6,by=.01)
n<- 5
xbar<- 2.5
```

```
sums=c()
for(i in length(theta))
{
  sum=0
  for(j in 1:n)
  {
    sum= sum+(xbar-theta)^2
  }

  sums=rbind(sums,sum)
}

}
```

```
llike <- log(n) + log (1/sqrt(2*pi))+-.5*sums
like <- exp(llike-max(llike))
```

```
plot(theta,like,type='n',
      xlab=expression(theta),
      ylab='Likelihood')
```

```
lines(theta,like,lty='dotted',lwd=1.5)
```

```
##Loop to find argmax
```

```
Mxinit= log(n) + log (1/sqrt(2*pi))+-.5*sums[1]
```

```
Mx=0
```

```
argmx=-50
```

```
for(i in 1:length(sums))
```

```
{
  Mx=log(n) + log (1/sqrt(2*pi))+-.5*sums[i]
  if (Mx > Mxinit)
  {
    Mxinit=Mx
    argmx=theta[i]
  }
}
```

```
}
```

```
#END ARGMAX loop
```

```
max(like)
```

```
J=paste("The likelihood ratio is ",round(max(like),2)," at ",round(argmx,2), sep="")
```

```
title(J)
```

```
#Plot 4 Normal x max=3.5
```

```
theta <- seq(-1,6,by=.01)
```

```
theta
```

```
n<- 5
```

```
xn<- 3.5
```

```
llike <- log(dnorm(xn,mean=theta)) + (n-1)*log(pnorm(xn*sqrt(n),mean=theta*sqrt(n)))+log(n)
```

```
like <- exp(llike-max(llike))
```

```
plot(theta,like,type='n',
      xlab=expression(theta),
      ylab='Likelihood')
```

```
lines(theta,like,lty='dotted',lwd=1.5)
```

```
##Loop to find argmax
```

```
Mxinit=exp(log(dnorm(xn,mean=theta[1])) + (n-1)*log(pnorm(xn,mean=theta[1])))
```

```
Mxinit
Mx=0
argmx=-50

for(i in 1:length(theta))
{
  Mx=exp(log(dnorm(xn,mean=theta[i])) + (n-1)*log(pnorm(xn,mean=theta[i])))
print(Mx)
  if (Mx > Mxinit)
  {
    Mxinit=Mx
    argmx=theta[i]
  }
}

#END ARGMX loop
J=paste("The likelihood ratio is 1 at ",round(argmx,2), sep="")
title(J)
```