PROBABILITY & STATISTICS

LAB – 6

Heli Vijay Naliapara(K068)

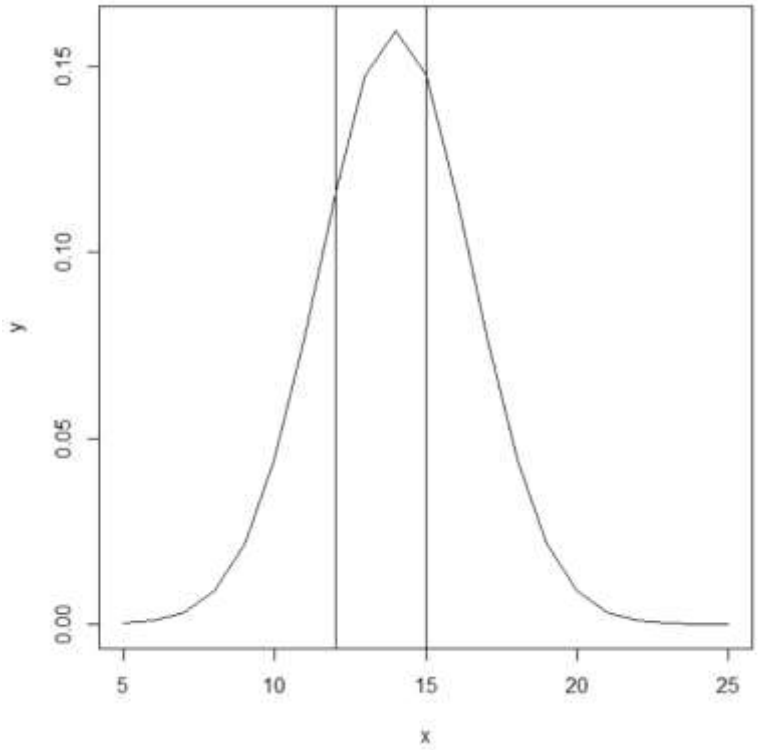
#q1

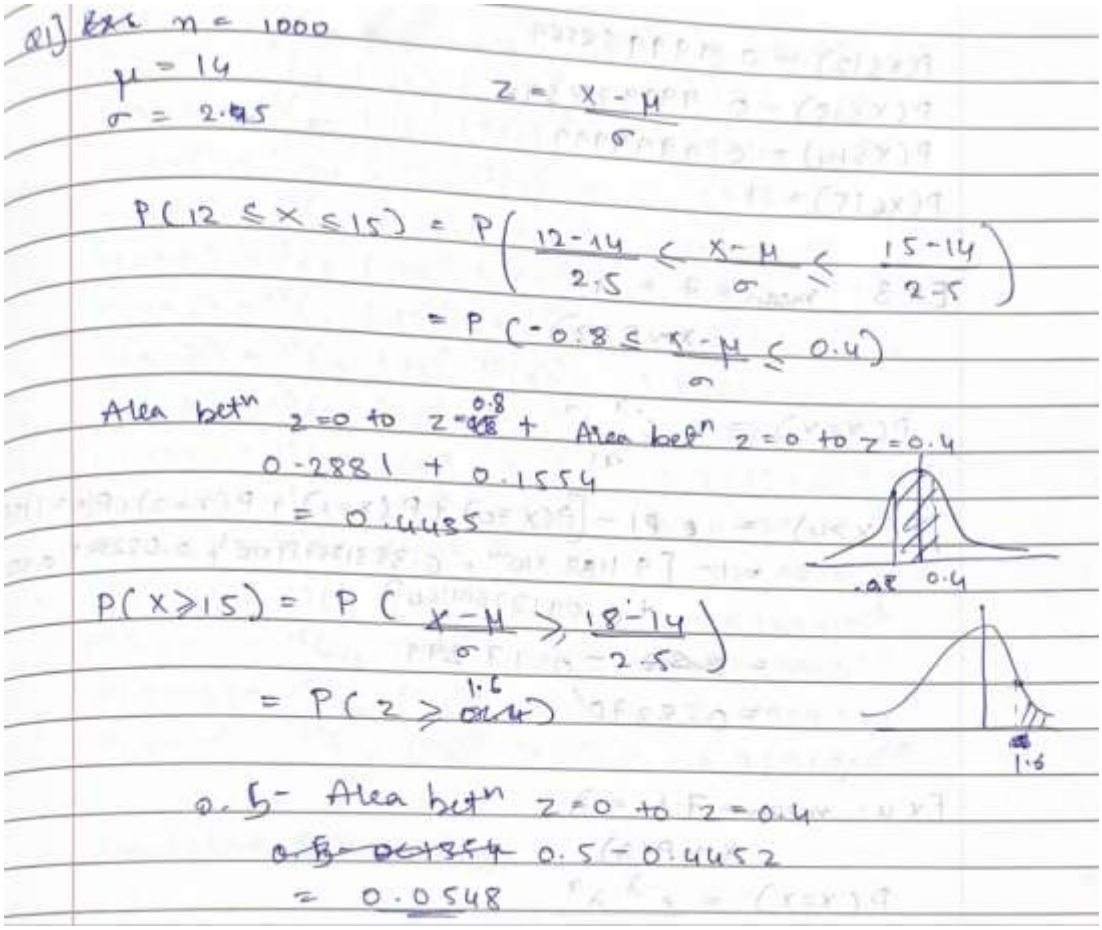
```
a=(pnorm(15,14,2.5)-pnorm(12,14,2.5)*1000)
b=(pnorm(18,14,2.5, lower.tail=FALSE)*1000)
c=(pnorm(18,14,2.5, lower.tail=TRUE)*1000)
print(round(a))
print(round(b))
print(round(c))
x=seq(5,25,by=1)
y=dnorm(x,14,2.5)
plot(x,y,type="l")
abline(v=12)
abline(v=15)
```

OUTPUT:

```
> #q1
>
> a=(pnorm(15,14,2.5)-pnorm(12,14,2.5)*1000)
> b=(pnorm(18,14,2.5, lower.tail=FALSE)*1000)
> c=(pnorm(18,14,2.5, lower.tail=TRUE)*1000)
> print(round(a))
[1] -211
> print(round(b))
[1] 55
> print(round(c))
[1] 945
> x=seq(5,25,by=1)
> y=dnorm(x,14,2.5)
> plot(x,y,type="l")
> abline(v=12)
> abline(v=15)
>
```

PLOT:


0.15
0.10
0.05
0.00
y
5
10
15
20
25
x


a) n = 1000
μ = 14
σ = 2.5
z = (X - μ)/σ
P(12 ≤ X ≤ 15) = P((12-14)/2.5 ≤ (X-μ)/σ ≤ (15-14)/2.5)
= P(-0.8 ≤ (X-μ)/σ ≤ 0.4)
Area betn z=0 to z=0.8 + Area betn z=0 to z=0.4
0.2881 + 0.1554
= 0.4435
0.8
0.4
P(X ≥ 15) = P((X-μ)/σ ≥ (18-14)/2.5)
= P(z ≥ 1.6)
1.6
0.5 - Area betn z=0 to z=0.4
0.5 - 0.4452
= 0.0548

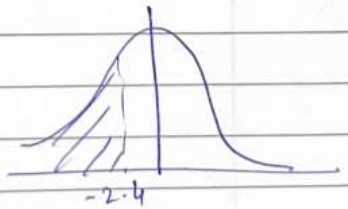
$P(X \leq 8) = P\left(\frac{X-\mu}{\sigma} \leq \frac{8-14}{2.5}\right)$

$P(z \leq -2.4)$

0.5 - Area betn $z = 0$ to $2.4 = 0.4918$ 0.00819

$\therefore 0.5 - 0.4918$

$= 0.0082$



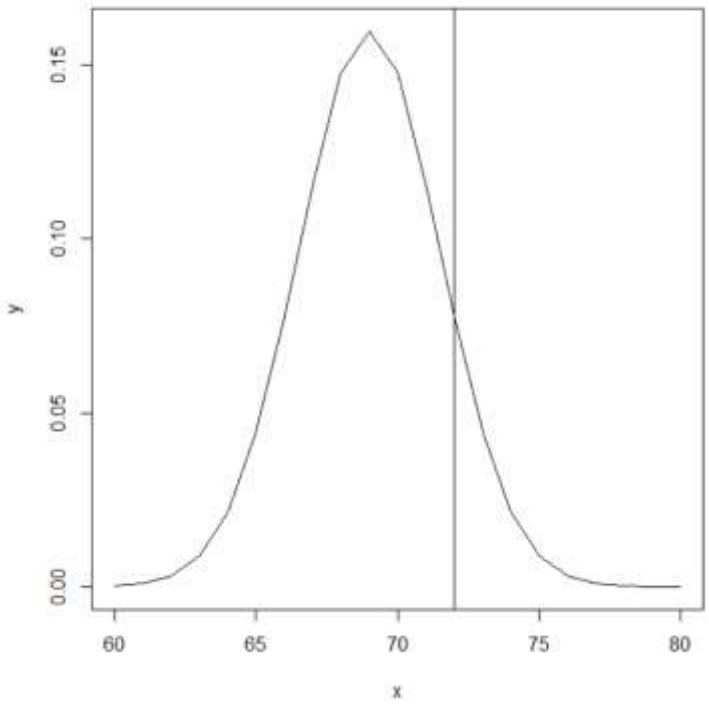
#q2

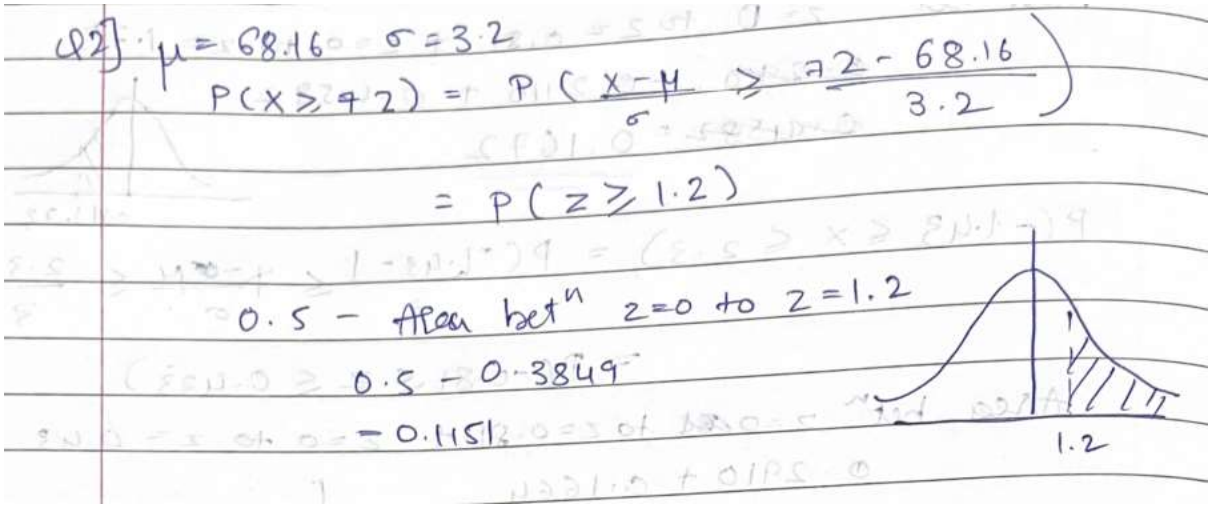
```
z=(pnorm(72,68.16,3.2,lower.tail=FALSE))*1000
print(round(z))
x=seq(60,80,by=1)
z=dnorm(x,68.16,3.2)
plot(x,y,type="l")
abline(v=72)
```

OUTPUT:

```
> #q2
>
> z=(pnorm(72,68.16,3.2,lower.tail=FALSE))*1000
> print(round(z))
[1] 115
> x=seq(60,80,by=1)
> z=dnorm(x,68.16,3.2)
> plot(x,y,type="l")
> abline(v=72)
>
```

PLOT:





#q3

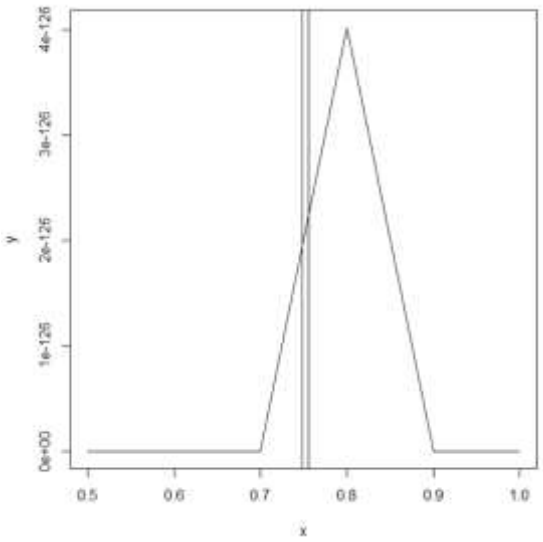
```
m=(pnorm(0.756,0.7515,0.0020)-pnorm(0.748,0.7515,0.0020))*1000
n=1000-m
print(round(n))
x=seq(0.5,1,by=0.1)
y=dnorm(x,0.7515,0.0020)
plot(x,y,type="l")
abline(v=0.748)
```

abline(v=0.756)

OUTPUT:

```
> #q3
>
> m=(pnorm(0.756,0.7515,0.0020)-pnorm(0.748,0.7515,0.0020))*1000
> n=1000-m
> print(round(n))
[1] 52
> x=seq(0.5,1,by=0.1)
> y=dnorm(x,0.7515,0.0020)
> plot(x,y,type="l")
> abline(v=0.748)
> abline(v=0.756)
>
```

PLOT:



Q3] $\mu = 0.7515$ $\sigma = 0.0020$

$P(0.748 \leq X \leq 0.756)$

$P\left(\frac{0.748 - 0.7515}{0.0020} \leq \frac{X - \mu}{\sigma} \leq \frac{0.756 - 0.7515}{0.0020}\right)$

$P(-1.75 \leq z \leq 2.25)$

Area bet^{n} $z=0$ to $z=1.75$ + $z=0$ to $z=2.25$

0.4599 + 0.4878

$= 0.9477$

$0.9477 \times 1000 = 947.7$

≈ 948

-1.75 2.25

$1000 - 948 = 52$

Hence 52 pl... be rejected if the diameter is to be 0.752 ± 0.004.

#q4

```
s=seq(-10,10,by=1)


#1)
x=pnorm(3.43,1,3)
y=pnorm(6.19,1,3)
z=y-x
print(z)
plot(s,dnorm(s,1,3),type="l")
abline(v=3.43)
abline(v=6.19)


#2)
x=pnorm(-1.43,1,3)
y=pnorm(2.3,1,3)
z=y-x
print(z)
plot(s,dnorm(s,1,3),type="l")
abline(v=-1.43)
abline(v=2.3)
```

OUTPUT:

```
> #q4
>
> s=seq(-10,10,by=1)
>
> #1)
> x=pnorm(3.43,1,3)
> y=pnorm(6.19,1,3)
> z=y-x
> print(z)
[1] 0.167155
> plot(s,dnorm(s,1,3),type="l")
> abline(v=3.43)
> abline(v=6.19)
>
> #2)
> x=pnorm(-1.43,1,3)
> y=pnorm(2.3,1,3)
> z=y-x
> print(z)
[1] 0.4586436
> plot(s,dnorm(s,1,3),type="l")
> abline(v=-1.43)
> abline(v=2.3)
>
```

Q4] $\mu = 1 \quad \sigma = 3$

$$P(3.43 \leq x \leq 6.19) = P\left(\frac{3.43-1}{3} \leq \frac{x-\mu}{\sigma} \leq \frac{6.19-1}{3}\right)$$

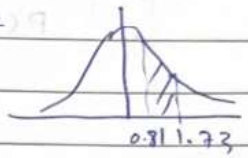
$$P(0.81 \leq z \leq 1.73)$$

A

- Area betn $z=0$ to $z=0.81$ + $z=0$ to $z=1.73$

$0.2910 + 0.4582$

$0.4582 - 0.2910 = 0.1672$



$$P(-1.43 \leq x \leq 2.3) = P\left(\frac{-1.43-1}{3} \leq \frac{x-\mu}{\sigma} \leq \frac{2.3-1}{3}\right)$$

$$= P(-0.81 \leq z \leq 0.43\bar{3})$$

Area betn $z=0$ to $z=0.81$ + $z=0$ to $z=0.43$

$0.2910 + 0.1664$

$= 0.4574$