

## WINTER SEMESTER 2021-2022

### Activity Sheet -7- Normal Distribution

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#### **I Find the area under the standard Normal Curve**

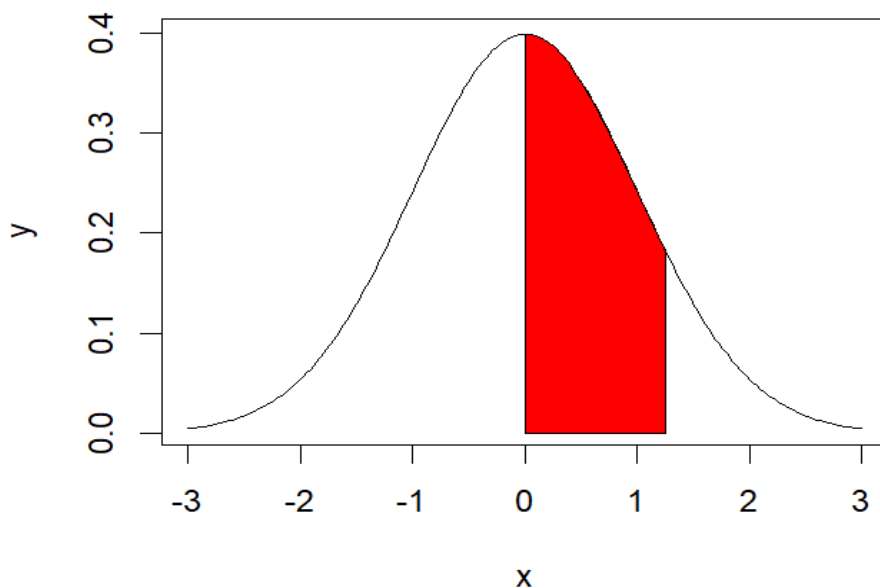
**AIM :** To find the area under the standard Normal Curve and the distribution value

#### **1.P ( $0 < Z < 1.25$ )**

##### **CODE:**

```
x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(0,1.25,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(0,x,1.25),c(0,y,0),col="red")
pnorm(1.25,mean=0,sd=1,lower.tail = TRUE)
```

##### **OUTPUT:**



```

> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(0,1.25,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(0,x,1.25),c(0,y,0),col="red")
> pnorm(1.25,mean=0,sd=1)-pnorm(0,mean=0,sd=1)
[1] 0.3943502
>

```

**2.P (-1.25 < Z < 0)**

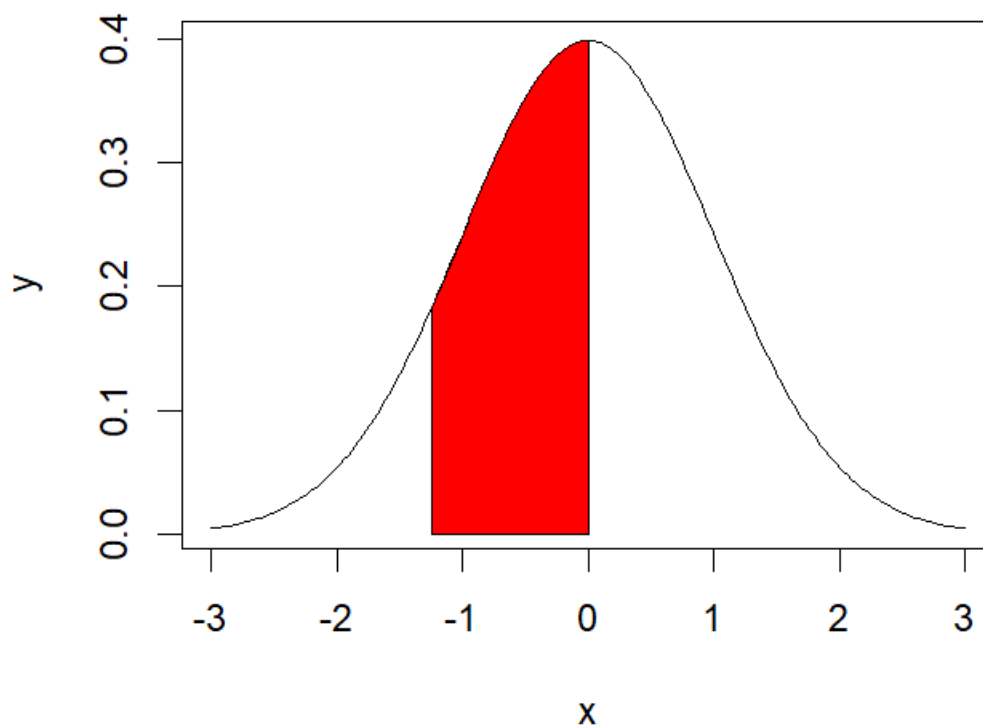
**CODE:**

```

x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(-1.25,0,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(-1.25,x,0),c(0,y,0),col="red")
pnorm(1.25,mean=0,sd=1)-pnorm(0,mean=0,sd=1)

```

**OUTPUT:**



```

> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(-1.25,0,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(-1.25,x,0),c(0,y,0),col="red")
> pnorm(1.25,mean=0,sd=1)-pnorm(0,mean=0,sd=1)
[1] 0.3943502
>

```

### 3. $P(0.6 < Z < 1.25)$

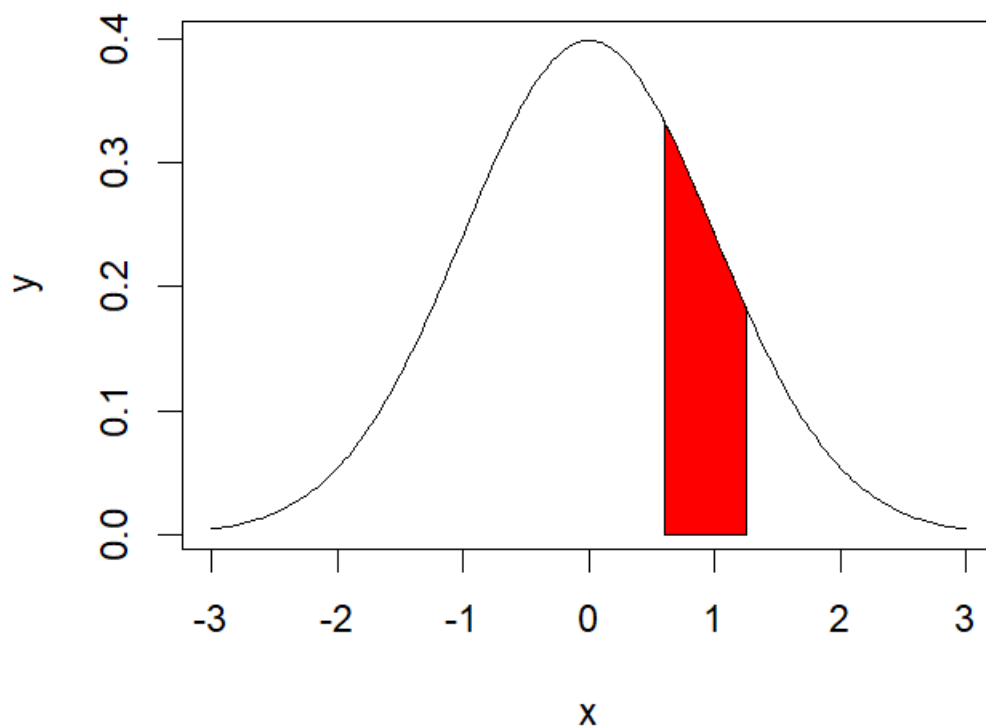
#### CODE:

```

x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(0.6,1.25,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(0.6,x,1.25),c(0,y,0),col="red")
pnorm(1.25,mean=0,sd=1)-pnorm(0.6,mean=0,sd=1)

```

#### OUTPUT:



```

> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(0.6,1.25,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(0.6,x,1.25),c(0,y,0),col="red")
> pnorm(1.25,mean=0,sd=1)-pnorm(0.6,mean=0,sd=1)
[1] 0.1686033

```

#### 4. $P(Z > 2.5)$

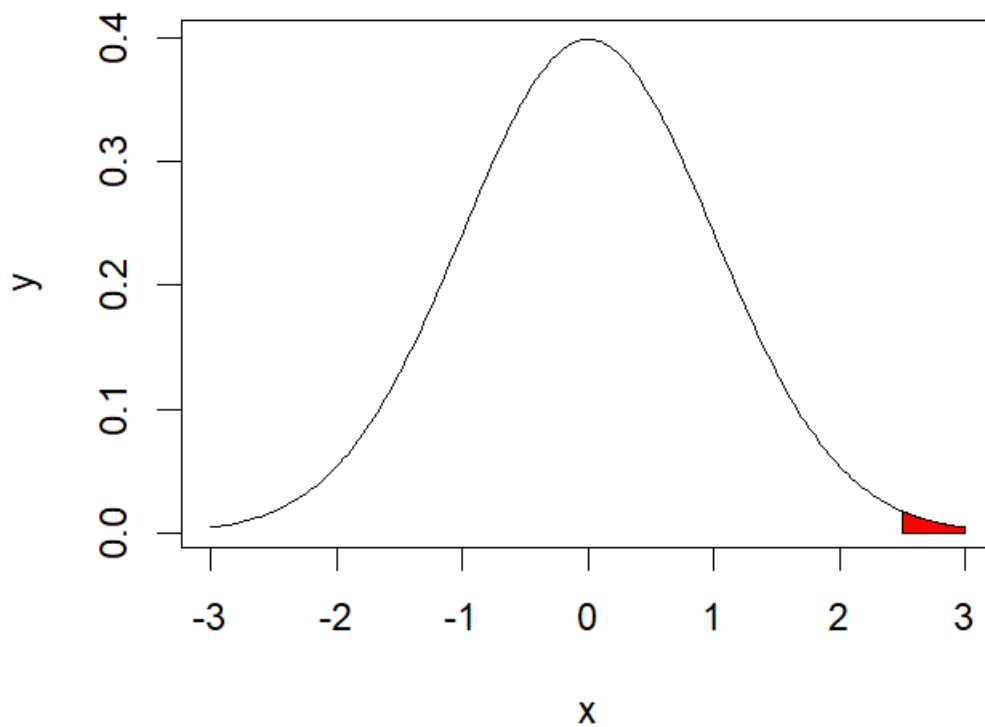
##### CODE:

```

x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(2.5,3,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(2.5,x,3),c(0,y,0),col="red")
pnorm(2.5,mean=0,sd=1,lower.tail=FALSE)

```

##### OUTPUT:



```

> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(2.5,3,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(2.5,x,3),c(0,y,0),col="red")
> pnorm(2.5,mean=0,sd=1,lower.tail=FALSE)
[1] 0.006209665
>

```

## 5. $P(Z < 2.5)$

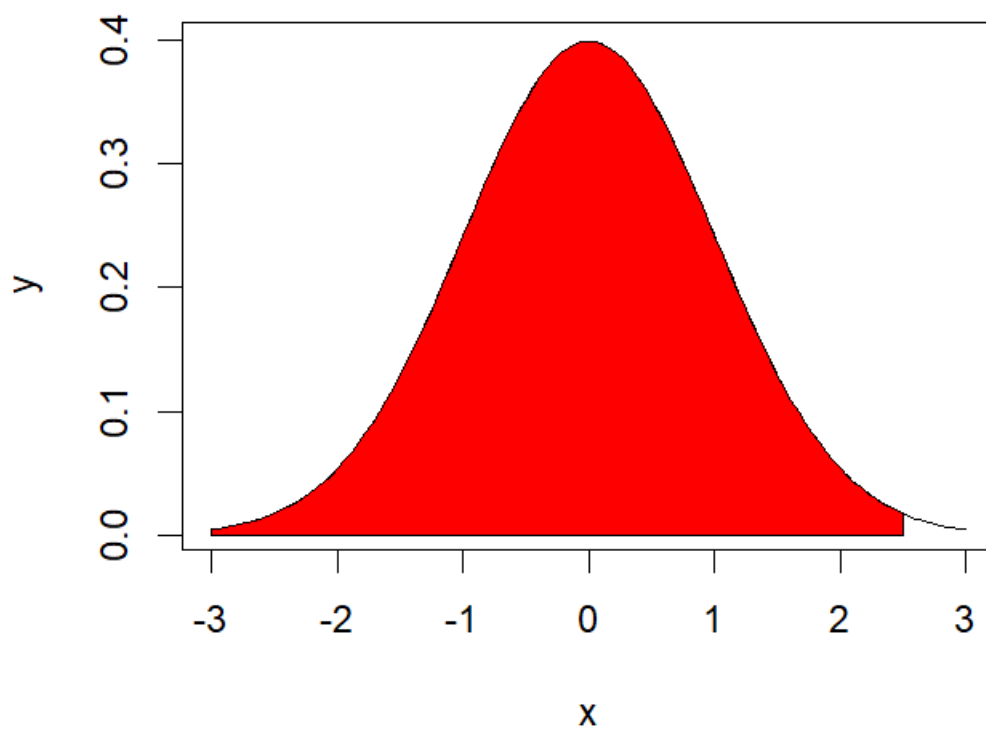
### CODE:

```

x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(-3,2.5,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(-3,x,2.5),c(0,y,0),col="red")
pnorm(2.5,mean=0,sd=1,lower.tail=TRUE)

```

### OUTPUT:



```

> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(-3,2.5,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(-3,x,2.5),c(0,y,0),col="red")
> pnorm(2.5,mean=0,sd=1,lower.tail=TRUE)
[1] 0.9937903
>

```

## 6. $P(Z > -2.5)$

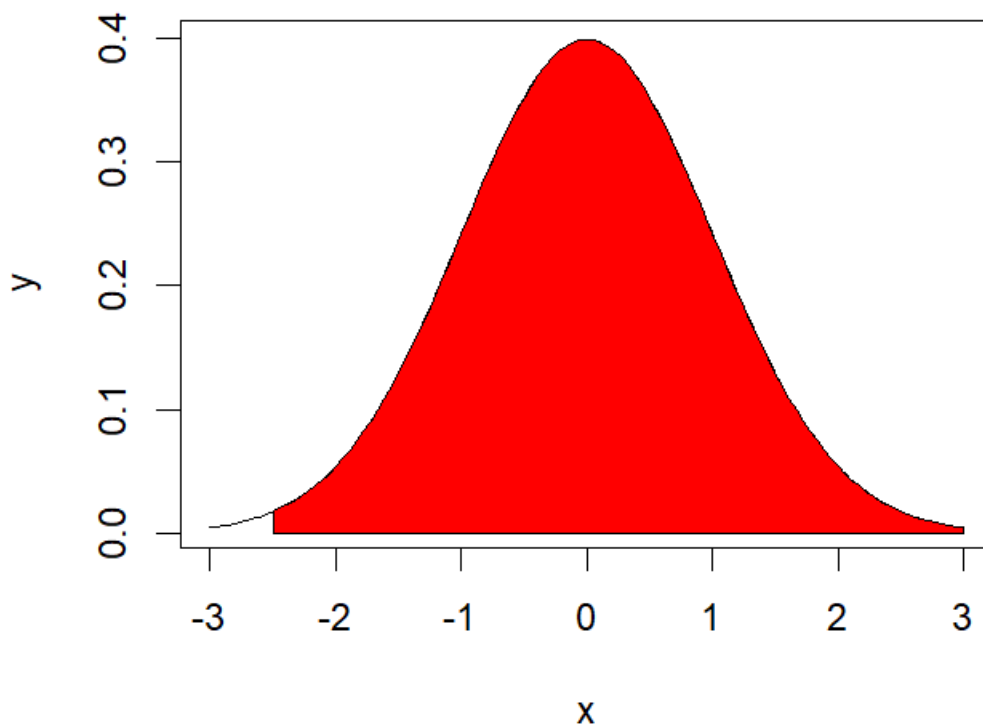
### CODE:

```

x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(-2.5,3,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(-2.5,x,3),c(0,y,0),col="red")
pnorm(-2.5,mean=0,sd=1,lower.tail=FALSE)

```

### OUTPUT:



```

> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(-2.5,3,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(-2.5,x,3),c(0,y,0),col="red")
> pnorm(-2.5,mean=0,sd=1,lower.tail=FALSE)
[1] 0.9937903
>

```

## 7. $P(Z < -2.5)$

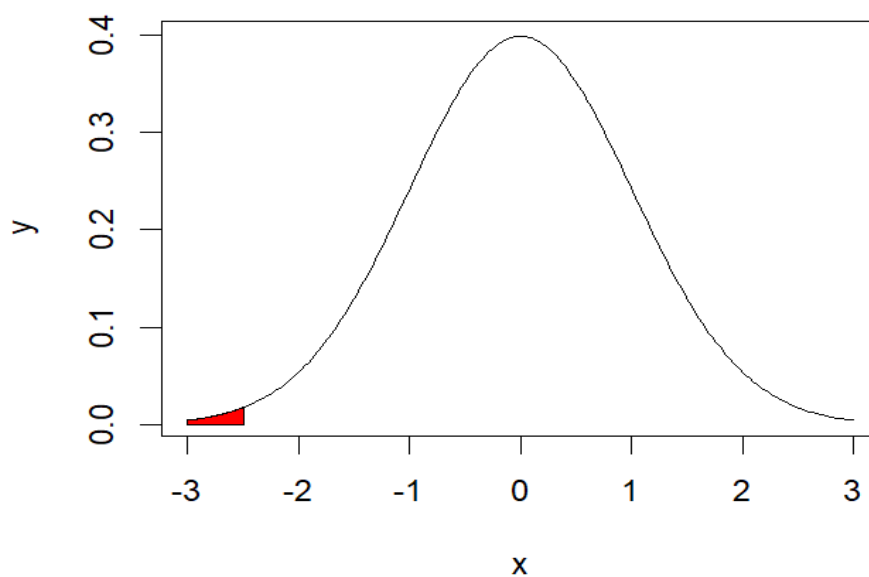
### CODE:

```

x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(-3,-2.5,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(-3,x,-2.5),c(0,y,0),col="red")
pnorm(-2.5,mean=0,sd=1,lower.tail=TRUE)

```

### OUTPUT:



```

> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(-3,-2.5,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(-3,x,-2.5),c(0,y,0),col="red")
> pnorm(-2.5,mean=0,sd=1,lower.tail=TRUE)
[1] 0.006209665

```

II) If  $X \sim N(50, 10^2)$ , find the probability that the value of the random variable  $X$  will be greater than 60.

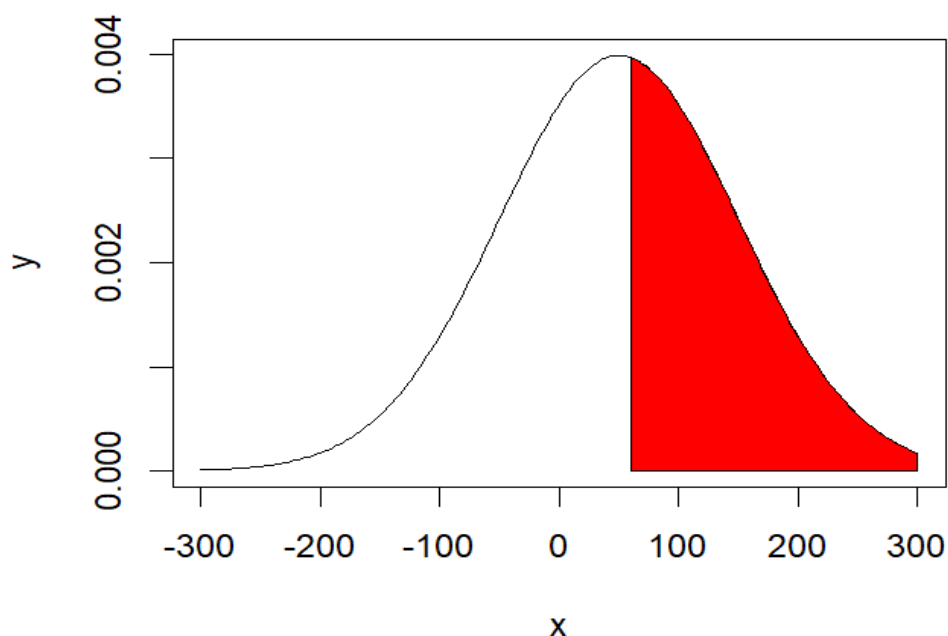
**CODE:**

```

x=seq(-300,300,length=200)
y=dnorm(x,mean=50,sd=100)
plot(x,y,type="l")
x=seq(60,300,length=100)
y=dnorm(x,mean=50,sd=100)
polygon(c(60,x,300),c(0,y,0),col="red")
pnorm(60,mean=50,sd=100,lower.tail=FALSE)

```

**OUTPUT:**





```

> x=seq(-300,300,length=200)
> y=dnorm(x,mean=50,sd=100)
> plot(x,y,type="l")
> x=seq(60,300,length=100)
> y=dnorm(x,mean=50,sd=100)
> polygon(c(60,x,300),c(0,y,0),col="red")
> pnorm(60,mean=50,sd=100,lower.tail=FALSE)
[1] 0.4601722
> |

```

**III) The weekly wage of 2000 workmen is normally distribution with mean wage of Rs 70 and wage standard deviation of Rs 5. Estimate the number of workers whose weekly wages are**

- (a) between Rs 70 and Rs 71 (b) between Rs 69 and Rs 73  
(c) more than Rs 72 (d) less than Rs 65**

**AIM :** To find the area under the standard Normal Curve and the distribution value

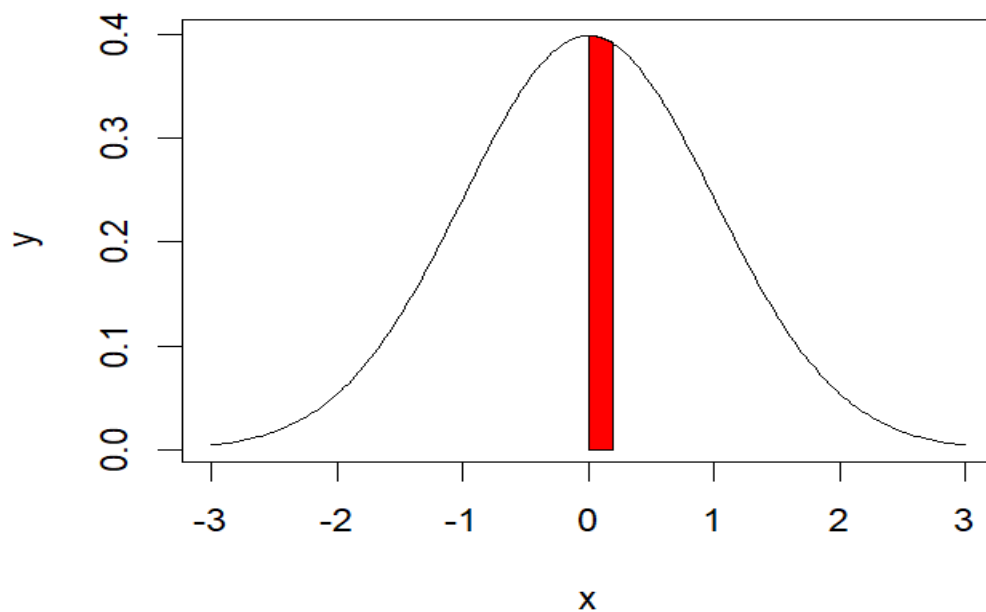
**CODE:**

```

x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(0,0.2,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(0,x,0.2),c(0,y,0),col="red")
ans=(pnorm(0.2,mean=0,sd=1)-pnorm(0,mean=0,sd=1))*2000
ans

```

## OUTPUT:



```
> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(0,0.2,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(0,x,0.2),c(0,y,0),col="red")
> ans=(pnorm(0.2,mean=0,sd=1)-pnorm(0,mean=0,sd=1))*2000
> ans
[1] 158.5194
>
```

## CODE:

```
x=seq(-3,3,length=200)

y=dnorm(x,mean=0,sd=1)

plot(x,y,type="l")

x=seq(-0.2,0.6,length=100)

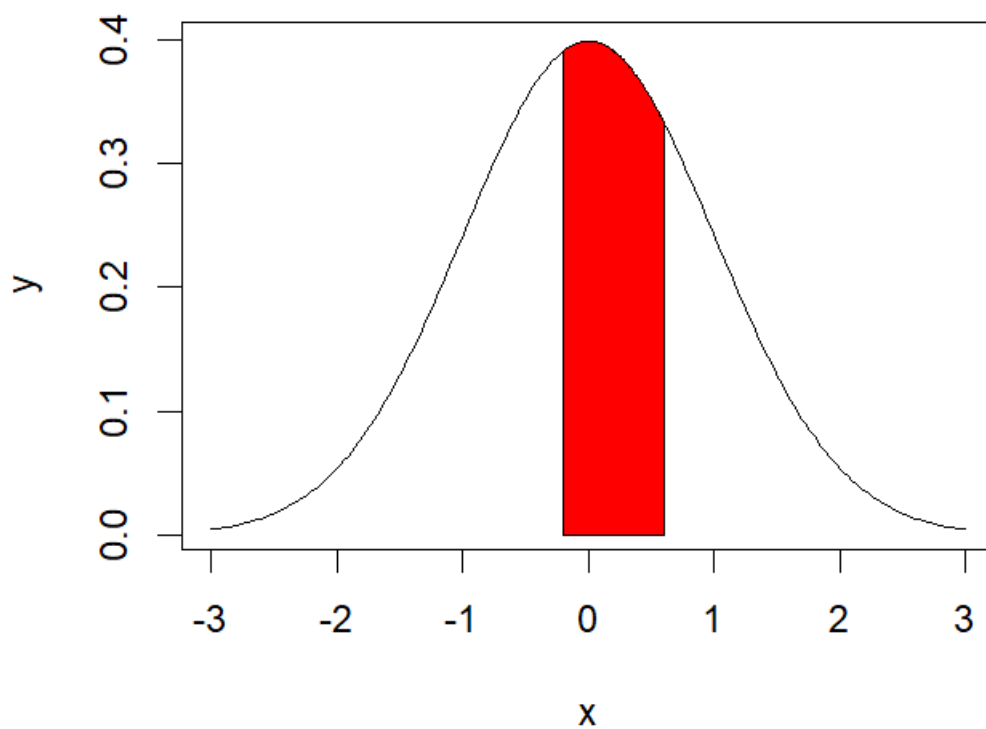
y=dnorm(x,mean=0,sd=1)

polygon(c(-0.2,x,0.6),c(0,y,0),col="red")

ans=(pnorm(-0.2,mean=0,sd=1)-pnorm(0.6,mean=0,sd=1))*-(2000)

ans
```

## OUTPUT:



```
> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(-0.2,0.6,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(-0.2,x,0.6),c(0,y,0),col="red")
> ans=(pnorm(-0.2,mean=0,sd=1)-pnorm(0.6,mean=0,sd=1))*-(2000)
> ans
[1] 610.0132
>
```

## CODE:

```
x=seq(-3,3,length=200)

y=dnorm(x,mean=0,sd=1)

plot(x,y,type="l")

x=seq(-0.2,0.6,length=100)

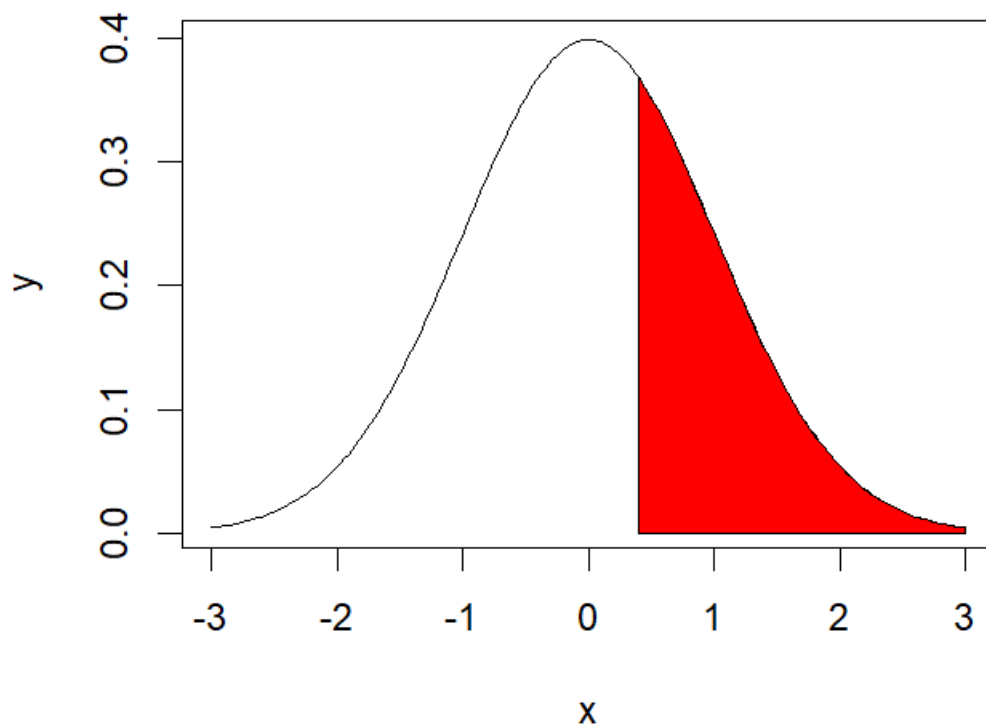
y=dnorm(x,mean=0,sd=1)
```

```
polygon(c(0.4,x,3),c(0,y,0),col="red")
```

```
ans=pnorm(0.4,mean=0,sd=1,lower.tail=FALSE)*2000
```

```
ans
```

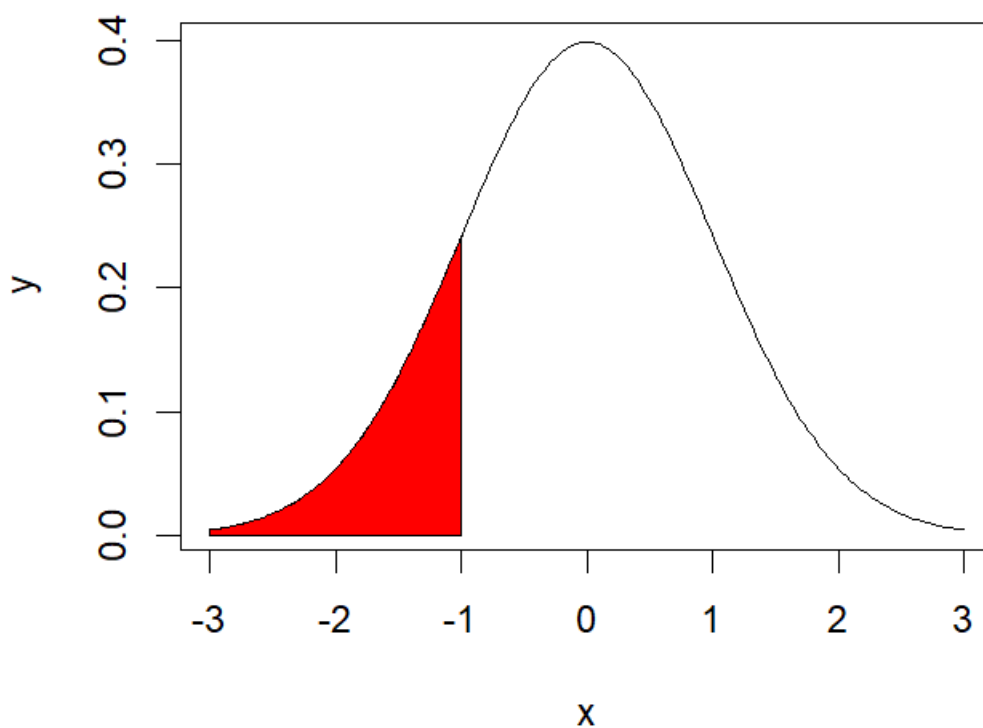
**OUTPUT:**



```
> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(0.4,3,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(0.4,x,3),c(0,y,0),col="red")
> ans=pnorm(0.4,mean=0,sd=1,lower.tail=FALSE)*2000
> ans
[1] 689.1565
> |
```

**CODE:**

```
x=seq(-3,3,length=200)
y=dnorm(x,mean=0,sd=1)
plot(x,y,type="l")
x=seq(-3,-1,length=100)
y=dnorm(x,mean=0,sd=1)
polygon(c(-3,x,-1),c(0,y,0),col="red")
ans=pnorm(-1,mean=0,sd=1,lower.tail=TRUE)*2000
ans
```

**OUTPUT:**

```
> x=seq(-3,3,length=200)
> y=dnorm(x,mean=0,sd=1)
> plot(x,y,type="l")
> x=seq(-3,-1,length=100)
> y=dnorm(x,mean=0,sd=1)
> polygon(c(-3,x,-1),c(0,y,0),col="red")
> ans=pnorm(-1,mean=0,sd=1,lower.tail=TRUE)*2000
> ans
[1] 317.3105
> |
```