

Lab6-RMD

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Task 1

Get working Directory

```
getwd()
```

```
## [1] "C:/Users/cglen/Documents/Stat Methods/Labs/LAB6"
```

Task 2

4 Plots of the norms

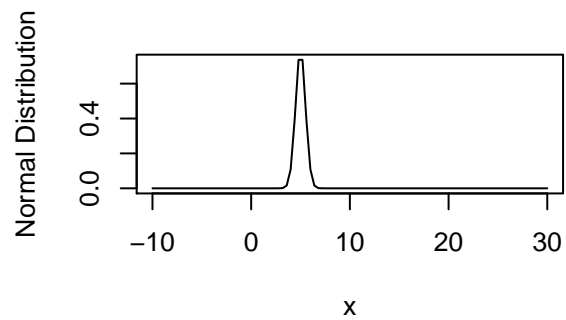
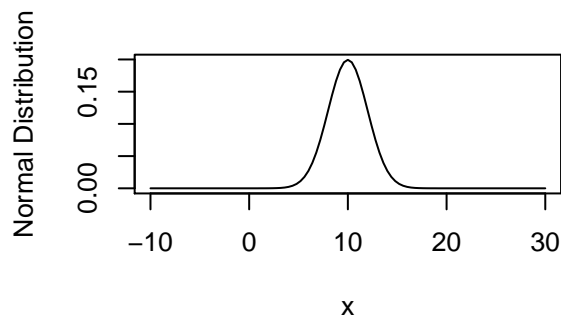
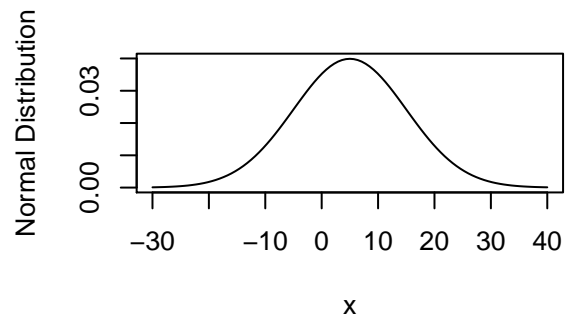
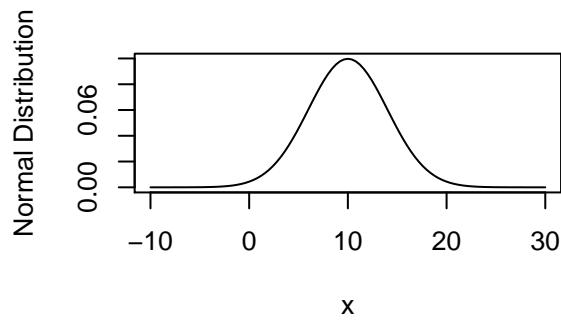
```
layout(matrix(1:4, nr = 2, nc = 2))

###Normal Density with mu = 10 and sd = 4
curve(dnorm(x, mean = 10, sd = 4),
      xlim = c(-10, 30),
      ylab = "Normal Distribution")

###Normal Density with mu = 10 and sd = 2
curve(dnorm(x, mean = 10, sd = 2),
      xlim = c(-10, 30),
      ylab = "Normal Distribution")

###Normal Density with mu = 5 and sd = 10
curve(dnorm(x, mean = 5, sd = 10),
      xlim = c(-30, 40),
      ylab = "Normal Distribution")

###Normal Density with mu = 5 and sd = .5
curve(dnorm(x, mean = 5, sd = 1 / 2),
      xlim = c(-10, 30),
      ylab = "Normal Distribution")
```

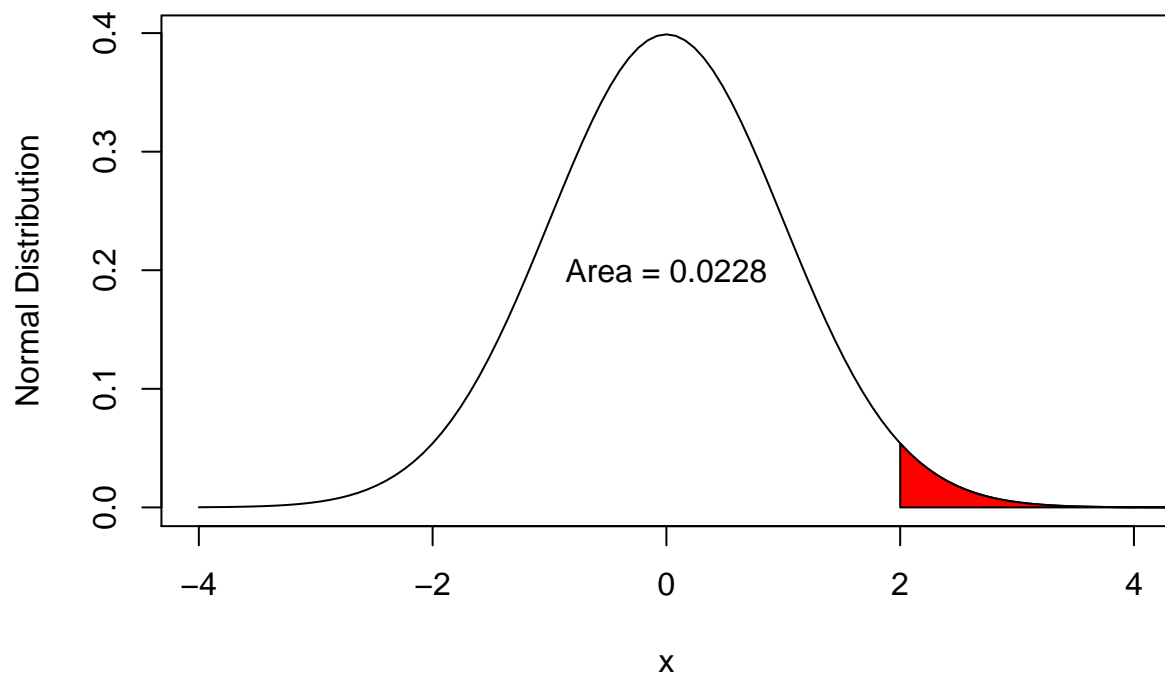


Plot the norms and show probability

Plot the norm of mean = 0 and sd = 1 and show probability of 2:30

```
curve(
  dnorm(x, mean = 0, sd = 1),
  xlim = c(-4, 4),
  ylab = "Normal Distribution",
  main = "Mean = 0, Standard Deviation = 1"
)
xcurve = seq(2, 30, length = 1000)
ycurve = dnorm(xcurve, mean = 0, sd = 1)
polygon(c(2, xcurve, 30), c(0, ycurve, 0), col = "Red")
prob = pnorm(30, mean = 0, sd = 1) - pnorm(2, mean = 0, sd = 1)
prob = round(prob, 4)
text(x = 0,
     y = 1 / 2 * dnorm(0, 0, 1),
     paste("Area = ", prob, sep = ""))
```

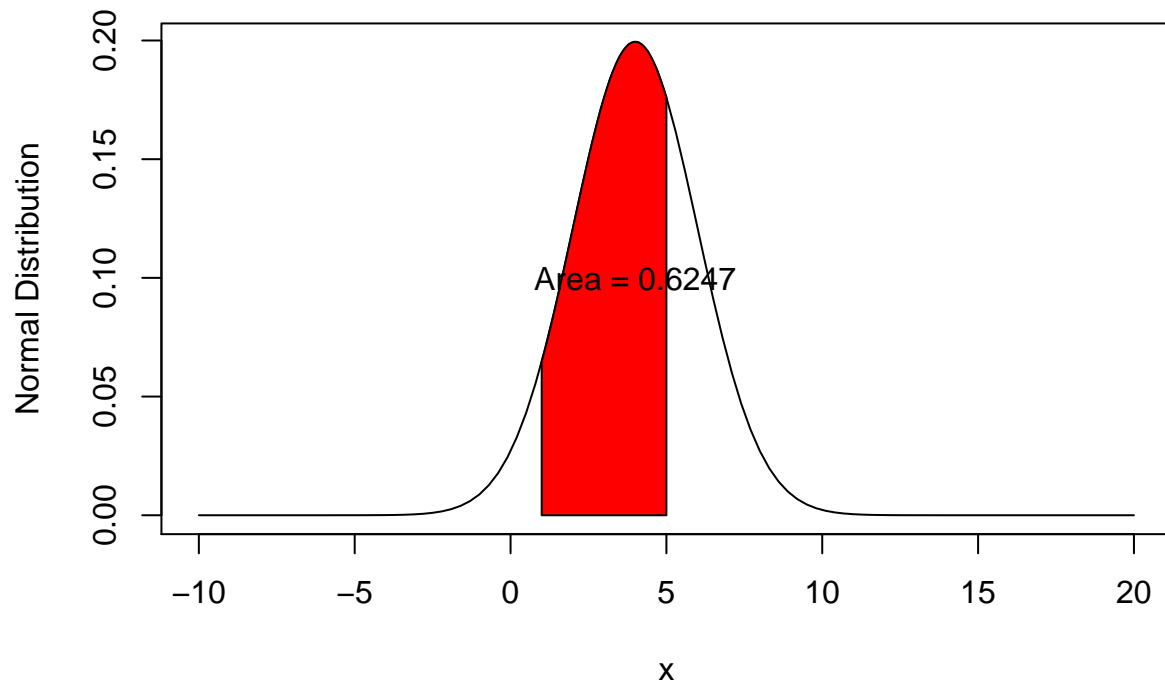
Mean = 0, Standard Deviation = 1



Plot the norm of mean = 4 and sd = 2 and show probability of 1:5

```
curve(
  dnorm(x, mean = 4, sd = 2),
  xlim = c(-10, 20),
  ylab = "Normal Distribution",
  main = "Mean = 4, Standard Deviation = 2"
)
xcurve = seq(1, 5, length = 1000)
ycurve = dnorm(xcurve, mean = 4, sd = 2)
polygon(c(1, xcurve, 5), c(0, ycurve, 0), col = "Red")
prob = pnorm(5, mean = 4, sd = 2) - pnorm(1, mean = 4, sd = 2)
prob = round(prob, 4)
text(x = 4,
     y = 1 / 2 * dnorm(4, 4, 2),
     paste("Area = ", prob, sep = ""))
```

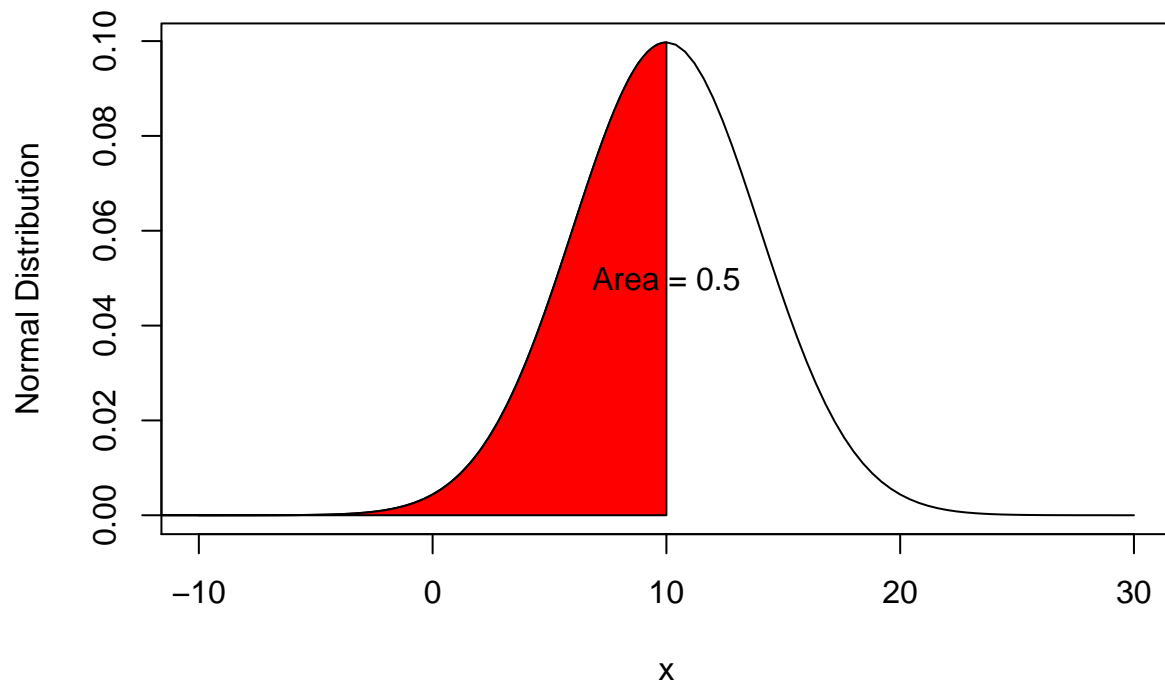
Mean = 4, Standard Deviation = 2



Plot the norm of mean = 10 and sd = 4 and show probability of -30:10

```
curve(
  dnorm(x, mean = 10, sd = 4),
  xlim = c(-10, 30),
  ylab = "Normal Distribution",
  main = "Mean = 10, Standard Deviation = 4"
)
xcurve = seq(-30, 10, length = 1000)
ycurve = dnorm(xcurve, mean = 10, sd = 4)
polygon(c(-30, xcurve, 10), c(0, ycurve, 0), col = "Red")
prob = pnorm(10, mean = 10, sd = 4) - pnorm(-30, mean = 10, sd = 4)
prob = round(prob, 4)
text(x = 10,
     y = 1 / 2 * dnorm(10, 10, 4),
     paste("Area = ", prob, sep = ""))
```

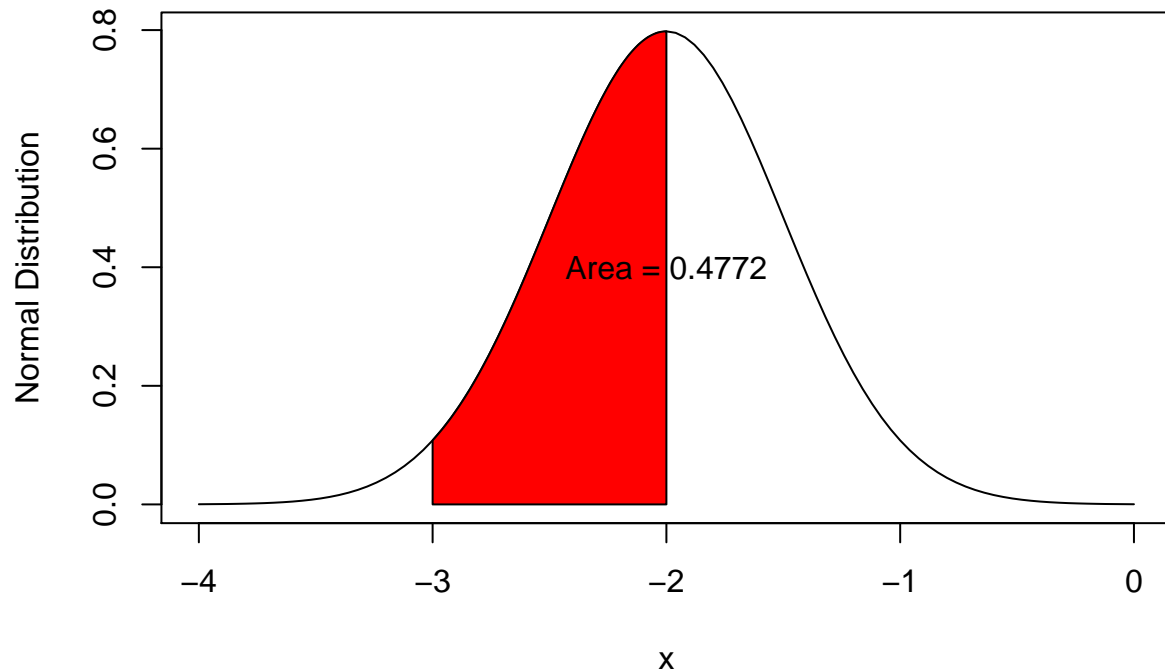
Mean = 10, Standard Deviation = 4



Plot the norm of mean = -2 and sd = 0.5 and show probability of -3:-2

```
curve(
  dnorm(x, mean = -2, sd = 1 / 2),
  xlim = c(-4, 0),
  ylab = "Normal Distribution",
  main = "Mean = -2, Standard Deviation = 1/2"
)
xcurve = seq(-3, -2, length = 1000)
ycurve = dnorm(xcurve, mean = -2, sd = 1 / 2)
polygon(c(-3, xcurve, -2), c(0, ycurve, 0), col = "Red")
prob = pnorm(-2, mean = -2, sd = 1 / 2) - pnorm(-3, mean = -2, sd = 1 / 2)
prob = round(prob, 4)
text(x = -2,
     y = 1 / 2 * dnorm(-2, -2, 1 / 2),
     paste("Area = ", prob, sep = ""))
```

Mean = -2, Standard Deviation = 1/2



Task 3

Plot the Gamma Distribution

Plot the gamma with shape = 1 and scale = 1

```
curve(
  dgamma(x, shape = 1, scale = 1),
  xlim = c(0, 10),
  ylim = c(0, 1),
  col = "Red",
  lwd = 2,
  ylab = "Gamma Density",
  main = "Beta = 1"
)
text(x = 2, y = 0.8, paste("Alpha = ", 1))

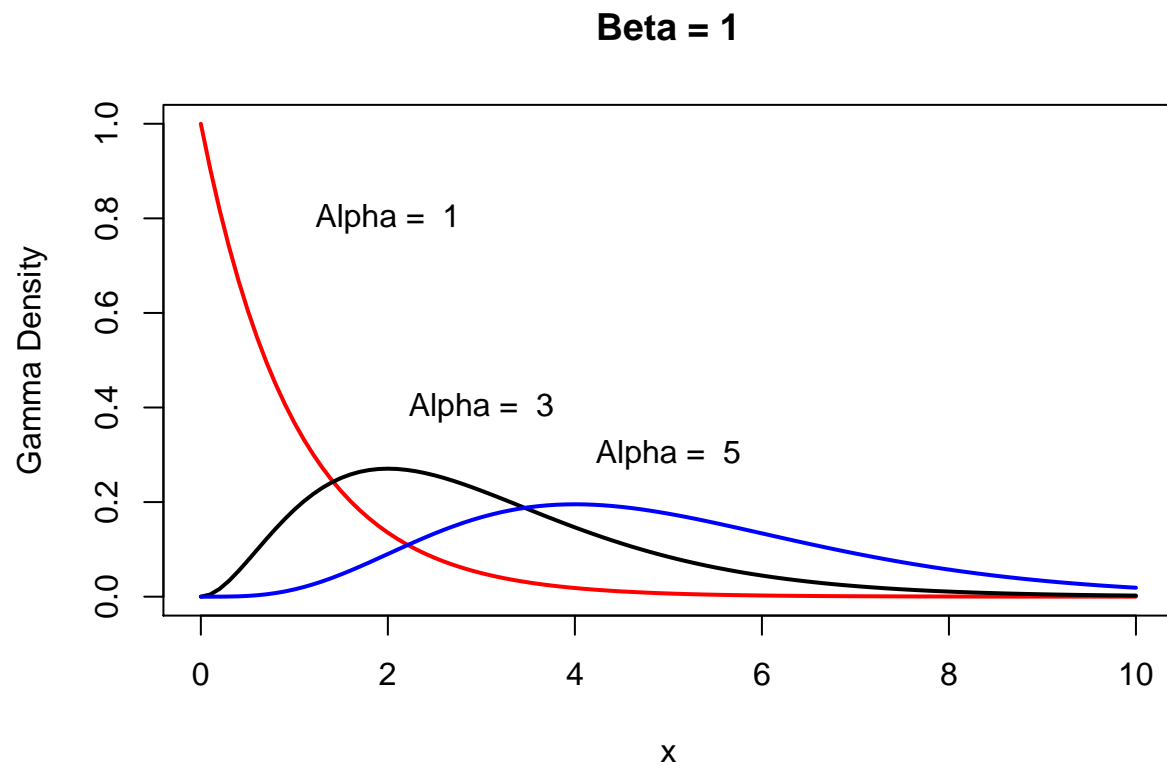
###Plot the gamma with shape = 3 and scale = 1
curve(
  dgamma(x, shape = 3, scale = 1),
  xlim = c(0, 10),
  ylim = c(0, 1),
  add = TRUE,
```

```

    lwd = 2
  )
  text(x = 3, y = 0.4, paste("Alpha = ", 3))

###Plot the gamma with shape = 5 and scale = 1
curve(
  dgamma(x, shape = 5, scale = 1),
  xlim = c(0, 10),
  ylim = c(0, 1),
  add = TRUE,
  col = "Blue",
  lwd = 2
)
text(x = 5, y = 0.3, paste("Alpha = ", 5))

```



Gamma Plots with Probabilities

Plot the gamma with shape = 3 and scale = 2 and show probability of 2:5

```

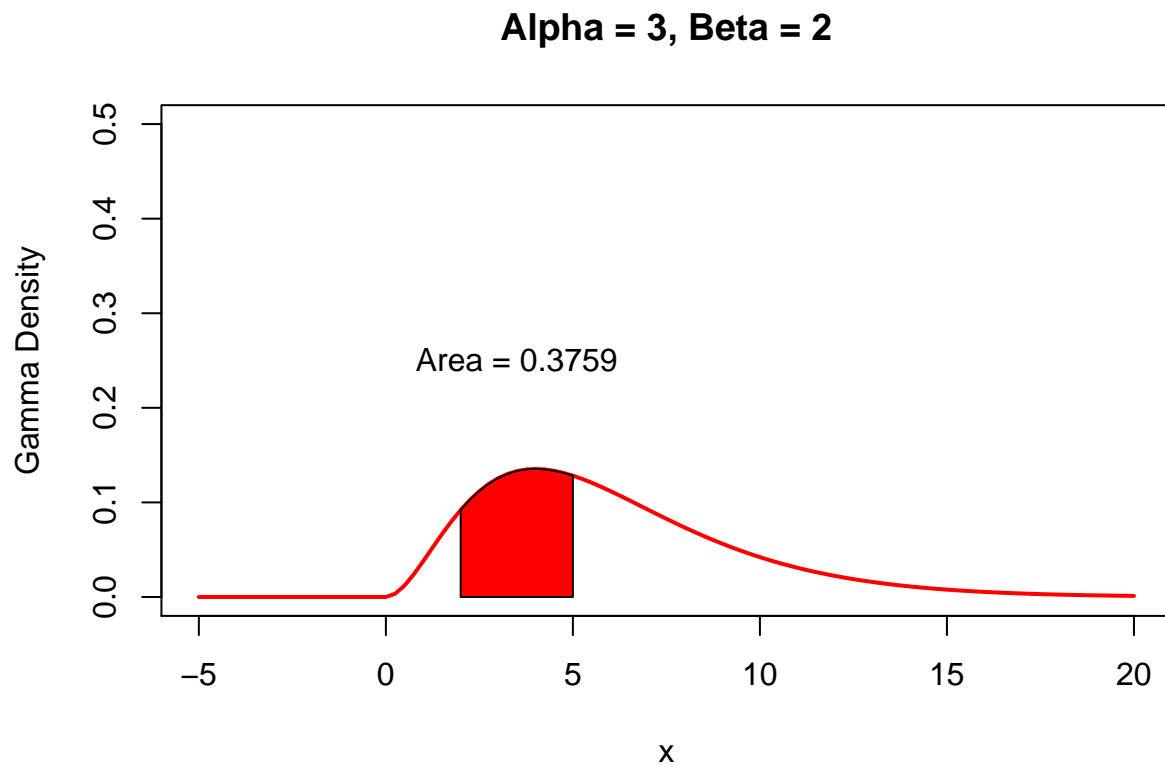
curve(
  dgamma(x, shape = 3, scale = 2),
  xlim = c(-5, 20),
  ylim = c(0, .5),
  col = "Red",

```

```

lwd = 2,
ylab = "Gamma Density",
main = "Alpha = 3, Beta = 2"
)
xcurve = seq(2, 5, length = 1000)
ycurve = dgamma(xcurve, shape = 3, scale = 2)
polygon(c(2, xcurve, 5), c(0, ycurve, 0), col = "Red")
prob = pgamma(5, shape = 3, scale = 2) - pgamma(2, shape = 3, scale = 2)
prob = round(prob, 4)
text(
  x = (2 + 5) / 2,
  y = 2 * dgamma(3, shape = 3, scale = 2),
  paste("Area = ", prob, sep = "")
)

```



Plot the gamma with shape = 6 and scale = 3 and show probability of 1:4

```

curve(
  dgamma(x, shape = 6, scale = 3),
  xlim = c(0, 10),
  ylim = c(0, .1),
  col = "Red",
  lwd = 2,
  ylab = "Gamma Density",

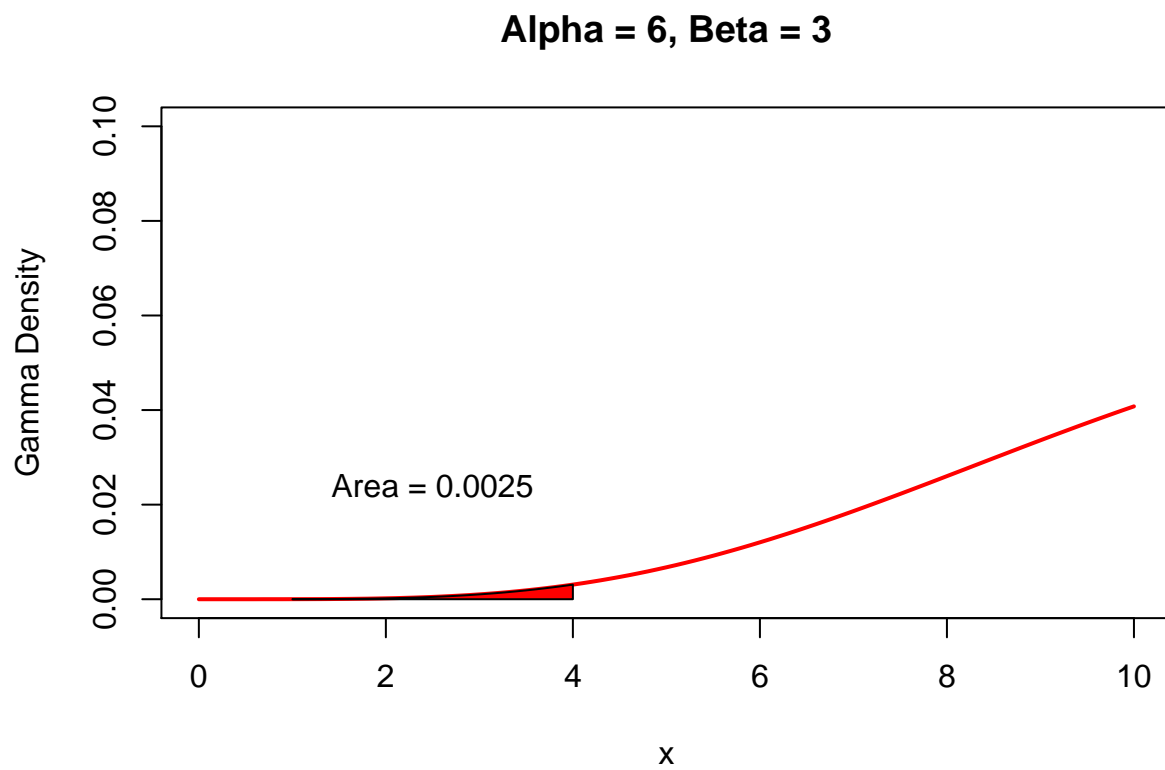
```



```

  main = "Alpha = 6, Beta = 3"
)
xcurve = seq(1, 4, length = 1000)
ycurve = dgamma(xcurve, shape = 6, scale = 3)
polygon(c(1, xcurve, 4), c(0, ycurve, 0), col = "Red")
prob = pgamma(4, shape = 6, scale = 3) - pgamma(1, shape = 6, scale = 3)
prob = round(prob, 4)
text(
  x = (1 + 4) / 2,
  y = 2 * dgamma(6, shape = 6, scale = 3),
  paste("Area = ", prob, sep = "")
)

```



Plot the gamma with shape = 2 and scale = 4 and show probability of 3:6

```

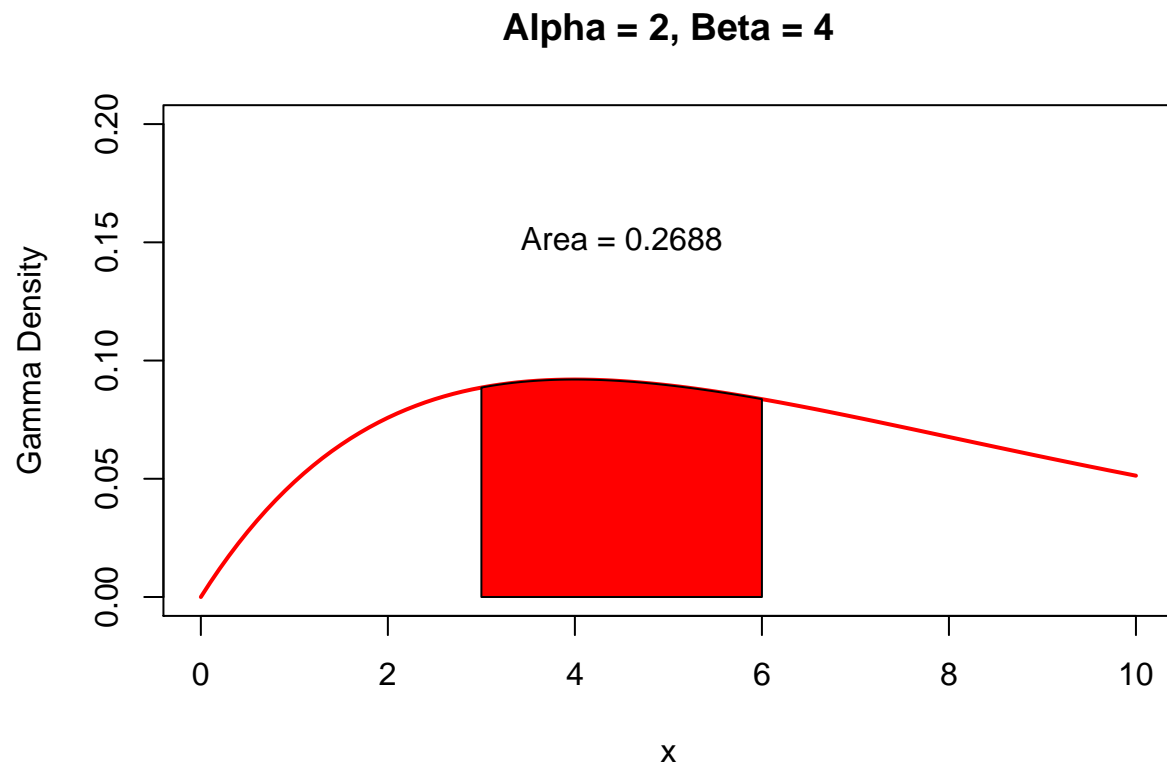
curve(
  dgamma(x, shape = 2, scale = 4),
  xlim = c(0, 10),
  ylim = c(0, .2),
  col = "Red",
  lwd = 2,
  ylab = "Gamma Density",
  main = "Alpha = 2, Beta = 4"
)

```

```

xcurve = seq(3, 6, length = 1000)
ycurve = dgamma(xcurve, shape = 2, scale = 4)
polygon(c(3, xcurve, 6), c(0, ycurve, 0), col = "Red")
prob = pgamma(6, shape = 2, scale = 4) - pgamma(3, shape = 2, scale = 4)
prob = round(prob, 4)
text(
  x = (3 + 6) / 2,
  y = 2 * dgamma(2, shape = 2, scale = 4),
  paste("Area = ", prob, sep = "")
)

```



Task 4

4 Plots of Chisq Density

```

layout(matrix(1:4, nr = 2, nc = 2))

###Plot of Chisq Density with Degrees of Freedom = 1
curve(
  dchisq(x, df = 1),
  xlim = c(0, 10),
  ylim = c(0, 1),
  col = "Blue",

```

```

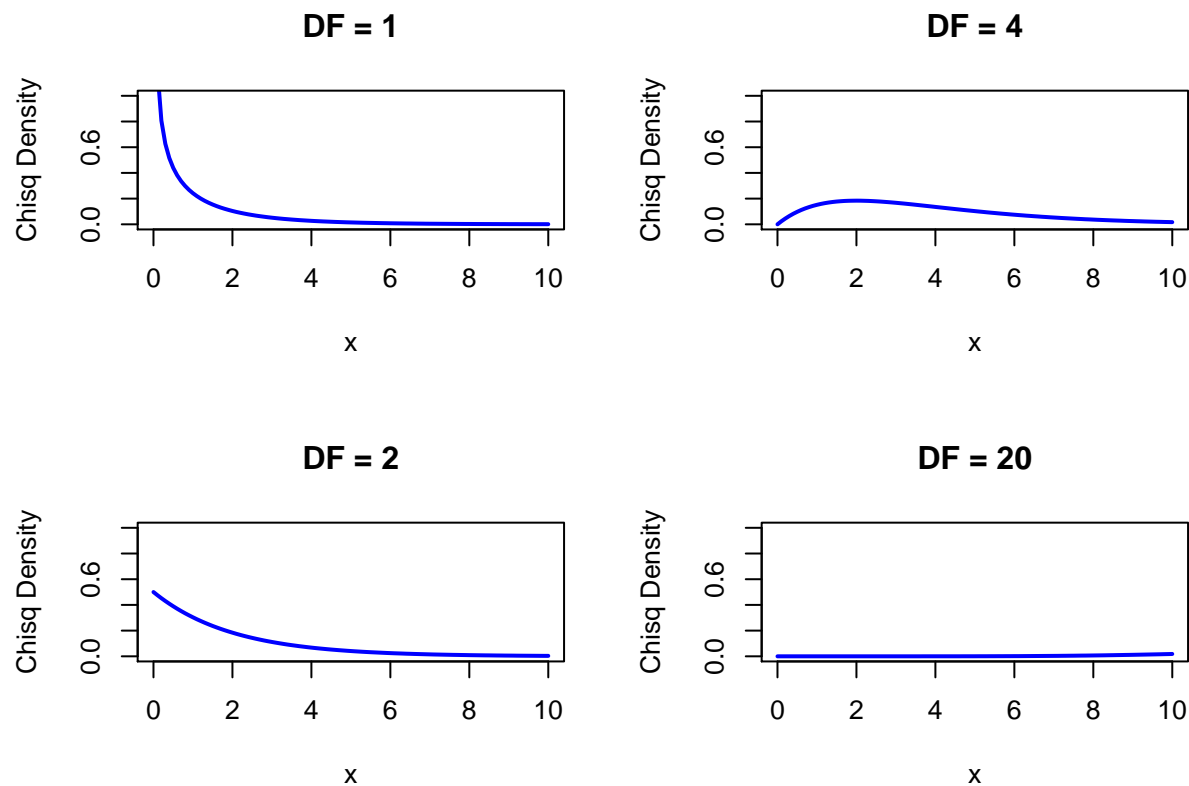
    lwd = 2,
    ylab = "Chisq Density",
    main = "DF = 1"
)

###Plot of Chisq Density with Degrees of Freedom = 2
curve(
  dchisq(x, df = 2),
  xlim = c(0, 10),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Chisq Density",
  main = "DF = 2"
)

###Plot of Chisq Density with Degrees of Freedom = 4
curve(
  dchisq(x, df = 4),
  xlim = c(0, 10),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Chisq Density",
  main = "DF = 4"
)

###Plot of Chisq Density with Degrees of Freedom = 20
curve(
  dchisq(x, df = 20),
  xlim = c(0, 10),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Chisq Density",
  main = "DF = 20"
)

```

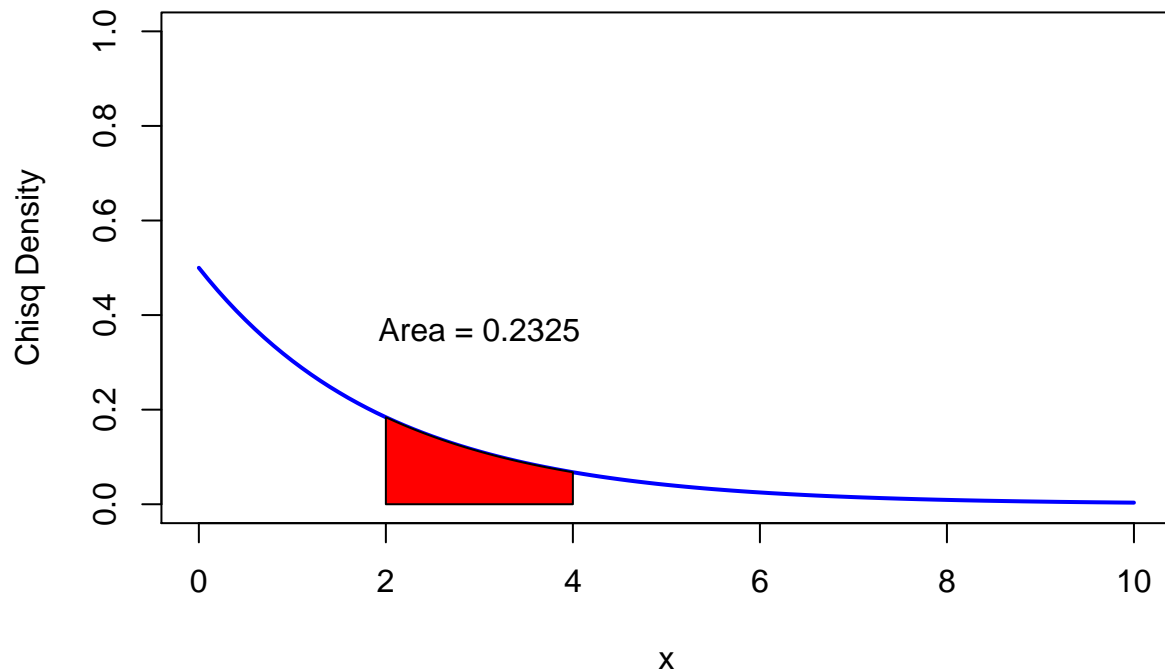


Plot Chisq Density With Probabilities

Plot of Chisq Density with Degrees of Freedom = 2 and show probability of 2:4

```
curve(
  dchisq(x, df = 2),
  xlim = c(0, 10),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Chisq Density",
  main = "Degrees of Freedom = 2"
)
xcurve = seq(2, 4, length = 1000)
ycurve = dchisq(xcurve, df = 2)
polygon(c(2, xcurve, 4), c(0, ycurve, 0), col = "Red")
prob = pchisq(4, df = 2) - pchisq(2, df = 2)
prob = round(prob, 4)
text(x = (2 + 4) / 2,
     y = 2 * dchisq(2, df = 2),
     paste("Area = ", prob, sep = ""))
```

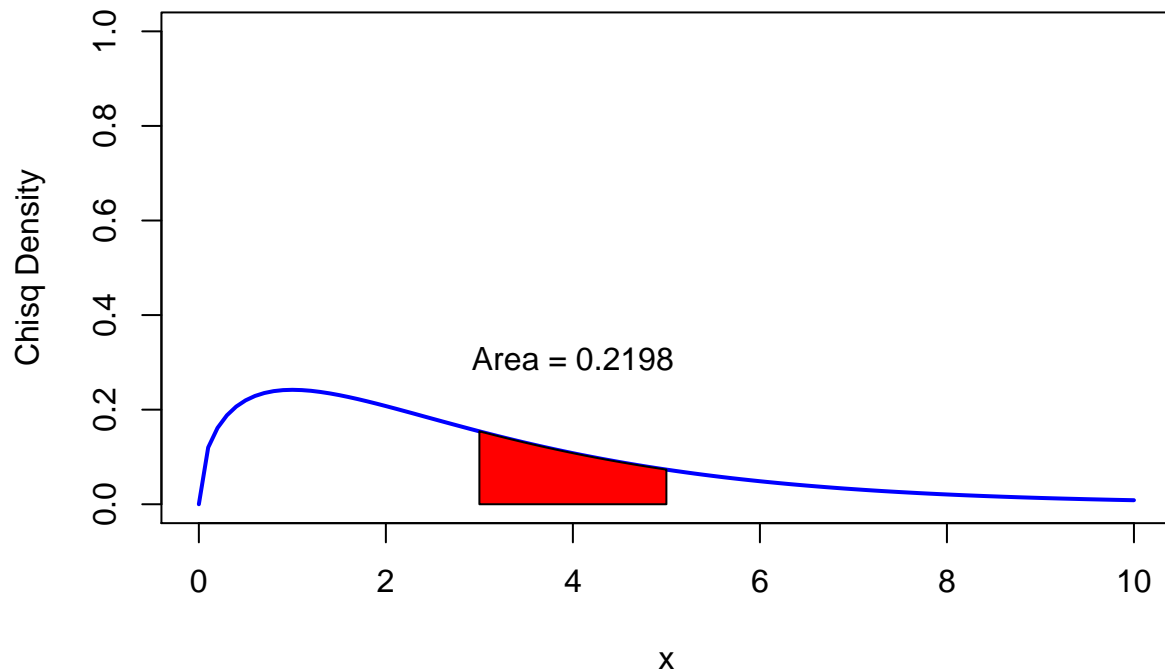
Degrees of Freedom = 2



Plot of Chisq Density with Degrees of Freedom = 3 and show probability of 3:5

```
curve(
  dchisq(x, df = 3),
  xlim = c(0, 10),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Chisq Density",
  main = "Degrees of Freedom = 3"
)
xcurve = seq(3, 5, length = 1000)
ycurve = dchisq(xcurve, df = 3)
polygon(c(3, xcurve, 5), c(0, ycurve, 0), col = "Red")
prob = pchisq(5, df = 3) - pchisq(3, df = 3)
prob = round(prob, 4)
text(x = (3 + 5) / 2,
     y = 2 * dchisq(3, df = 3),
     paste("Area = ", prob, sep = ""))
```

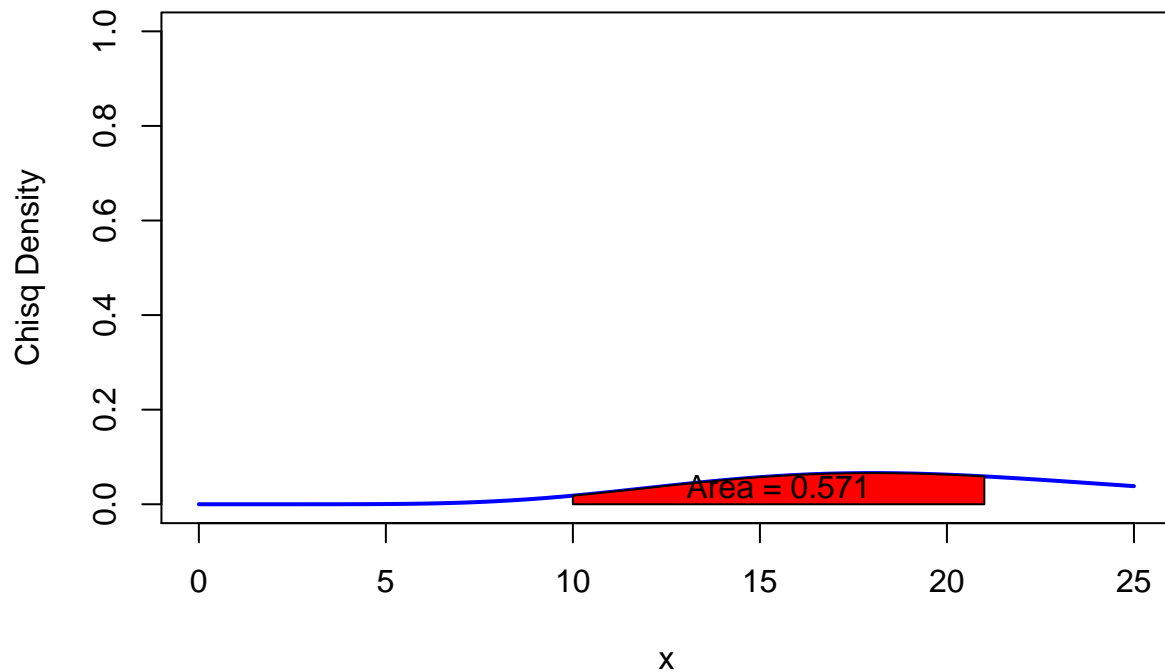
Degrees of Freedom = 3



Plot of Chisq Density with Degrees of Freedom = 20 and show probability of 10:21

```
curve(
  dchisq(x, df = 20),
  xlim = c(0, 25),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Chisq Density",
  main = "Degrees of Freedom = 20"
)
xcurve = seq(10, 21, length = 1000)
ycurve = dchisq(xcurve, df = 20)
polygon(c(10, xcurve, 21), c(0, ycurve, 0), col = "Red")
prob = pchisq(21, df = 20) - pchisq(10, df = 20)
prob = round(prob, 4)
text(x = (10 + 21) / 2,
     y = 2 * dchisq(10, df = 20),
     paste("Area = ", prob, sep = ""))
```

Degrees of Freedom = 20



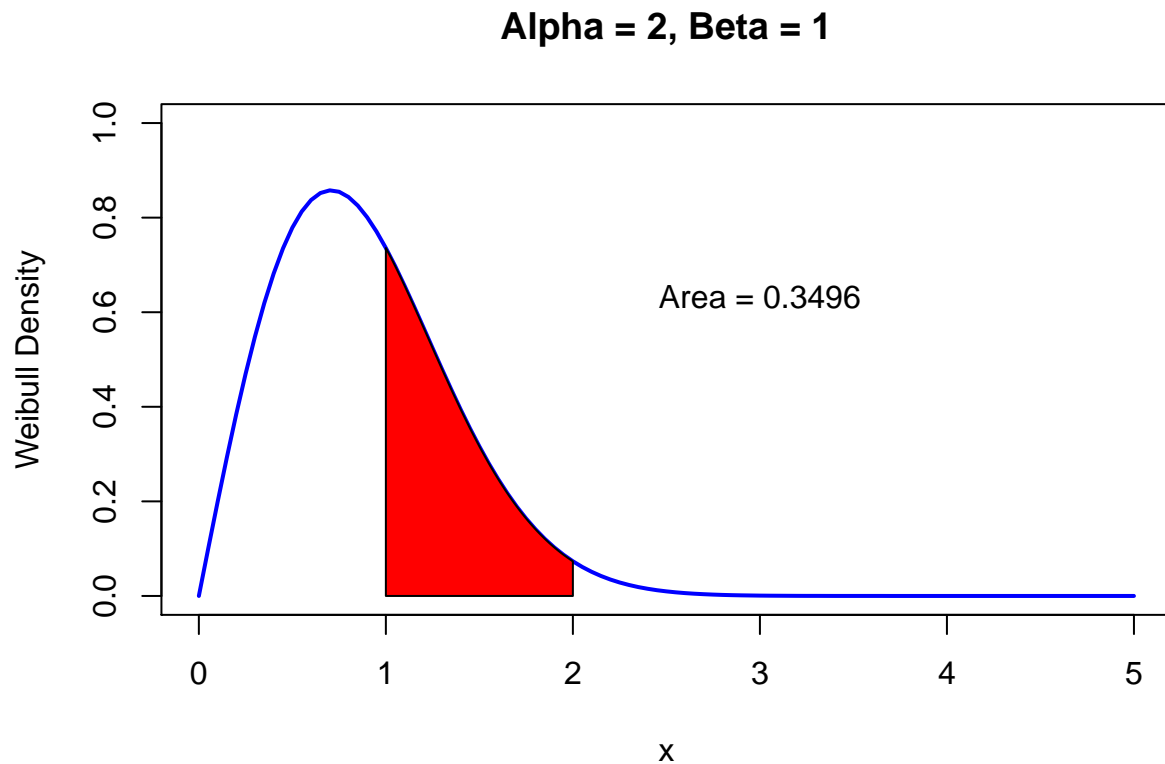
Task 5

Plots of Weibull Density with Probability

Plot of Weibull Density with shape = 2 and scale = 1 and show probability of 1:2

```
curve(
  dweibull(x, shape = 2, scale = 1),
  xlim = c(0, 5),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Weibull Density",
  main = "Alpha = 2, Beta = 1"
)
xcurve = seq(1, 2, length = 1000)
ycurve = dweibull(xcurve, shape = 2, scale = 1)
polygon(c(1, xcurve, 2), c(0, ycurve, 0), col = "Red")
prob = pweibull(2, shape = 2, scale = 1) - pweibull(1, shape = 2, scale = 1)
prob = round(prob, 4)
text(
  x = 3,
  y = 2 * dweibull(1.5, shape = 2, scale = 1),
```

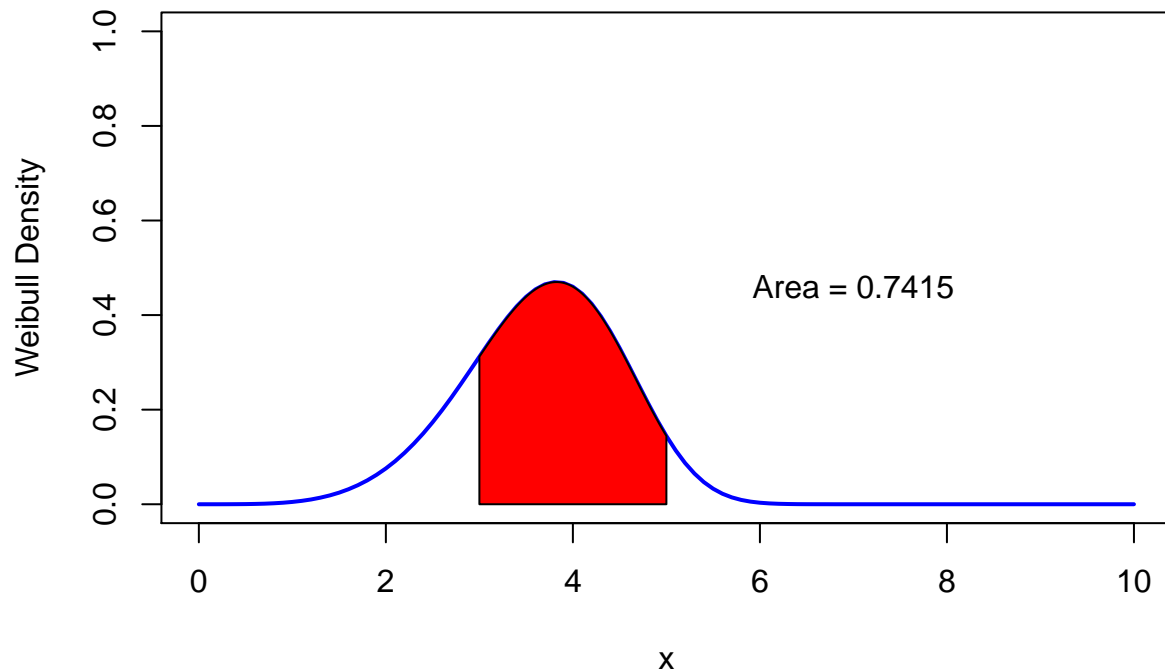
```
paste("Area = ", prob, sep = "")
)
```



Plot of Weibull Density with shape = 5 and scale = 4 and show probability of 3:5

```
curve(
  dweibull(x, shape = 5, scale = 4),
  xlim = c(0, 10),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Weibull Density",
  main = "Alpha = 5, Beta = 4"
)
xcurve = seq(3, 5, length = 1000)
ycurve = dweibull(xcurve, shape = 5, scale = 4)
polygon(c(3, xcurve, 5), c(0, ycurve, 0), col = "Red")
prob = pweibull(5, shape = 5, scale = 4) - pweibull(3, shape = 5, scale = 4)
prob = round(prob, 4)
text(
  x = 7,
  y = 1 * dweibull(4, shape = 5, scale = 4),
  paste("Area = ", prob, sep = "")
)
```

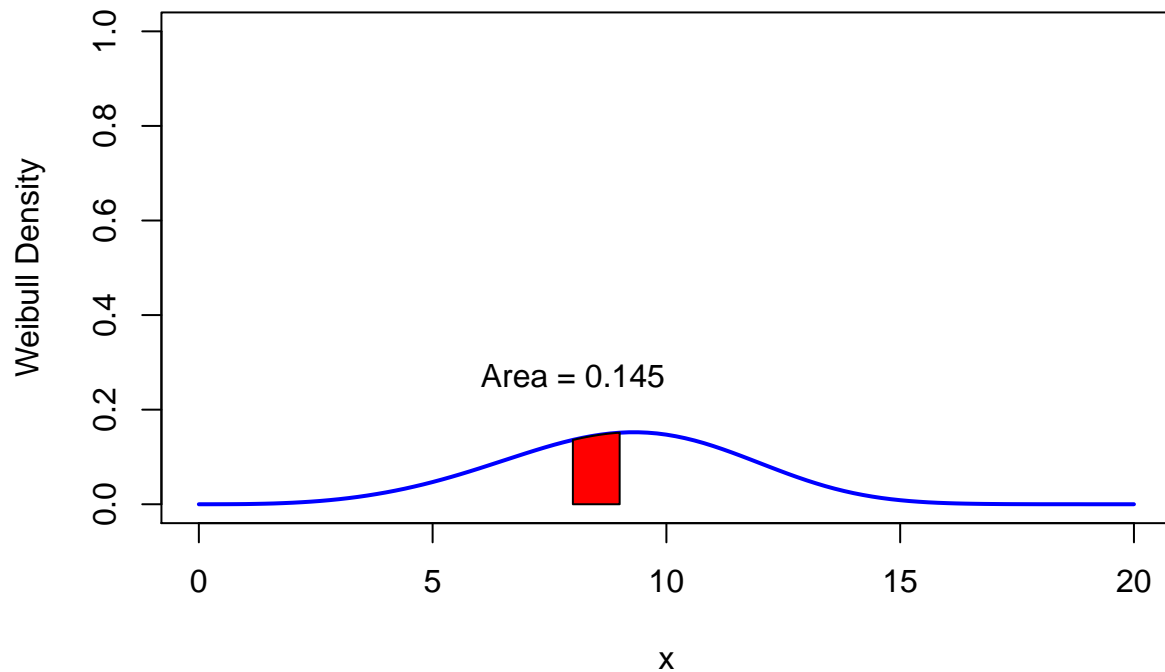

Alpha = 5, Beta = 4



Plot of Weibull Density with shape = 4 and scale = 10 and show probability of 8:9

```
curve(
  dweibull(x, shape = 4, scale = 10),
  xlim = c(0, 20),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Weibull Density",
  main = "Alpha = 4, Beta = 10"
)
xcurve = seq(8, 9, length = 1000)
ycurve = dweibull(xcurve, shape = 4, scale = 10)
polygon(c(8, xcurve, 9), c(0, ycurve, 0), col = "Red")
prob = pweibull(9, shape = 4, scale = 10) - pweibull(8, shape = 4, scale = 10)
prob = round(prob, 4)
text(
  x = 8,
  y = 2 * dweibull(8, shape = 4, scale = 10),
  paste("Area = ", prob, sep = "")
)
```

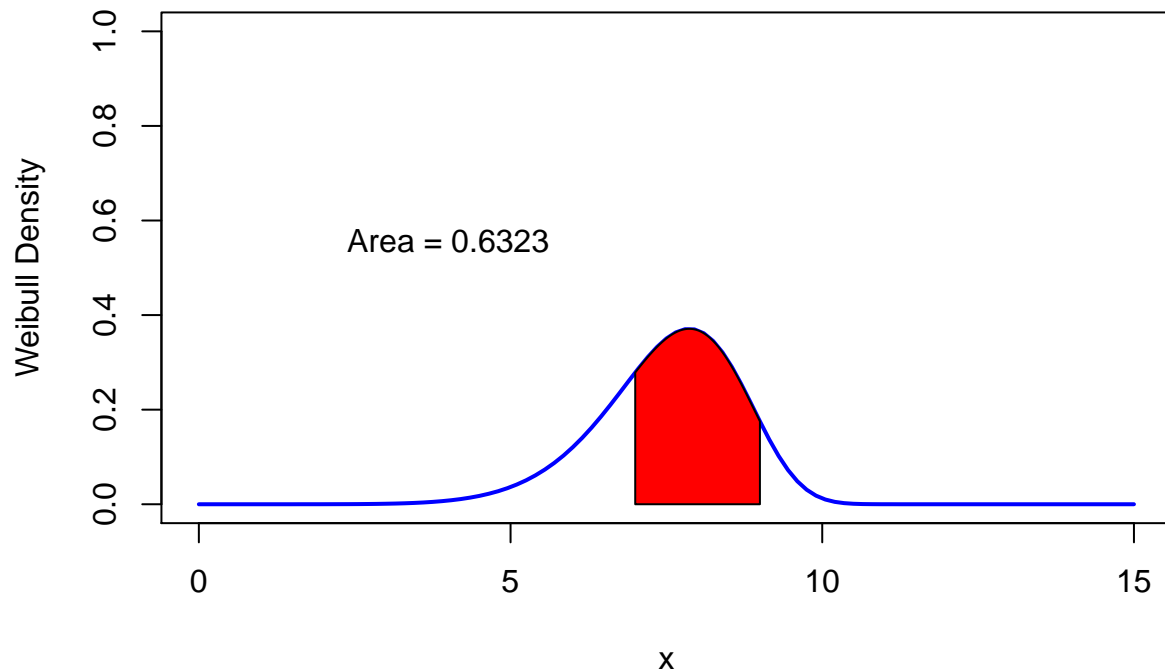
Alpha = 4, Beta = 10



Plot of Weibull Density with shape = 8 and scale = 8 and show probability of 7:9

```
curve(
  dweibull(x, shape = 8, scale = 8),
  xlim = c(0, 15),
  ylim = c(0, 1),
  col = "Blue",
  lwd = 2,
  ylab = "Weibull Density",
  main = "Alpha = 8, Beta = 8"
)
xcurve = seq(7, 9, length = 1000)
ycurve = dweibull(xcurve, shape = 8, scale = 8)
polygon(c(7, xcurve, 9), c(0, ycurve, 0), col = "Red")
prob = pweibull(9, shape = 8, scale = 8) - pweibull(7, shape = 8, scale = 8)
prob = round(prob, 4)
text(
  x = 4,
  y = 2 * dweibull(7, shape = 8, scale = 8),
  paste("Area = ", prob, sep = "")
)
```

Alpha = 8, Beta = 8



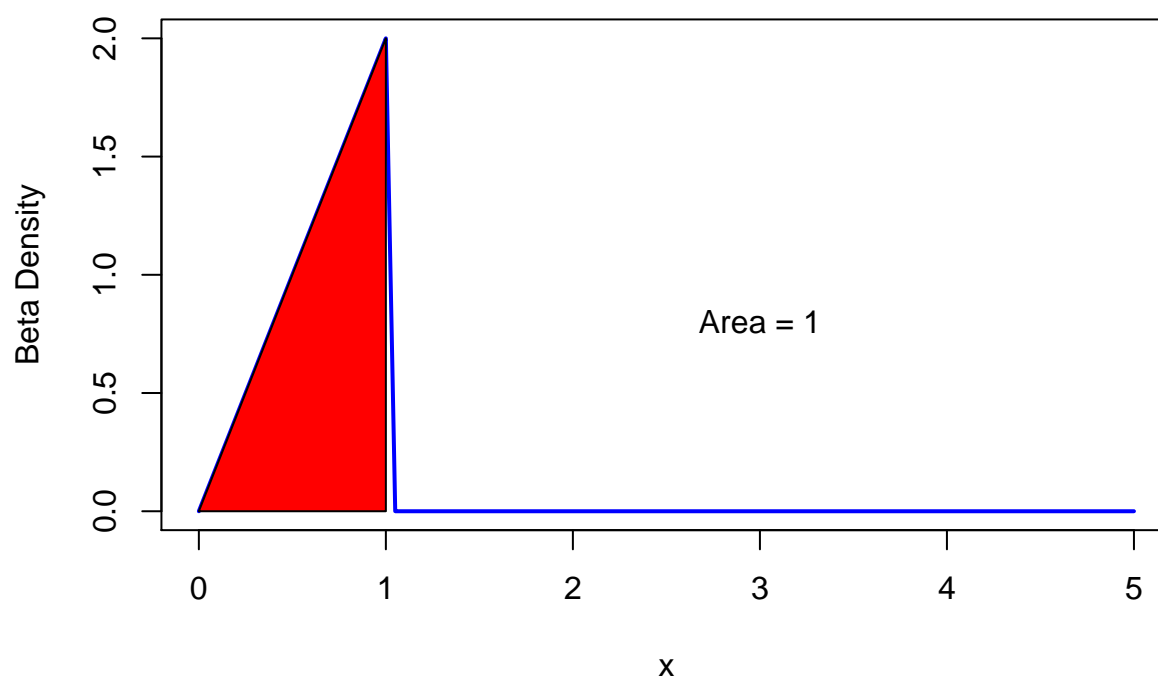
Task 6

Beta Plots with Distributions

Plot of Beta Density with shape1 = 2 and shape2 = 1 and show probability of 0:1

```
curve(
  dbeta(x, shape1 = 2, shape2 = 1),
  xlim = c(0, 5),
  ylim = c(0, 2),
  col = "Blue",
  lwd = 2,
  ylab = "Beta Density",
  main = "Shape1 = 2, Shape2 = 1"
)
xcurve = seq(0, 1, length = 1000)
ycurve = dbeta(xcurve, shape1 = 2, shape2 = 1)
polygon(c(0, xcurve, 1), c(0, ycurve, 0), col = "Red")
prob = pbeta(1, shape1 = 2, shape2 = 1) - pbeta(0, shape1 = 2, shape2 = 1)
prob = round(prob, 4)
text(x = 3,
     y = 0.8,
     paste("Area = ", prob, sep = ""))
```

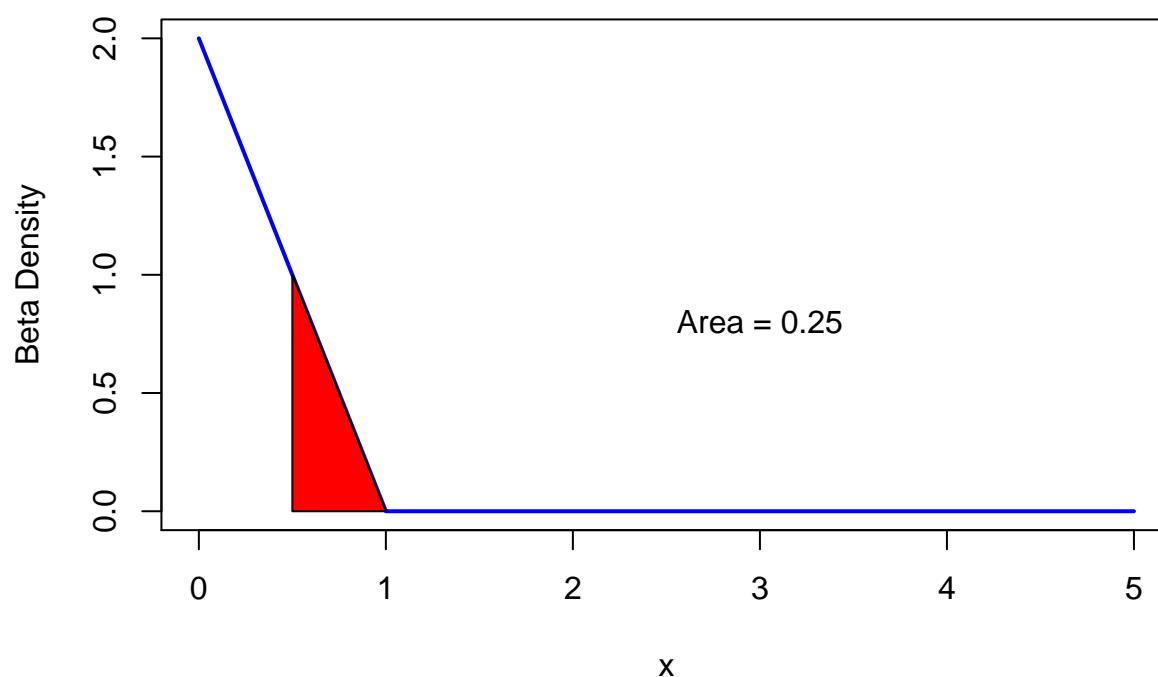
Shape1 = 2, Shape2 = 1



Plot of Beta Density with shape1 = 1 and shape2 = 2 and show probability of .5:1

```
curve(
  dbeta(x, shape1 = 1, shape2 = 2),
  xlim = c(0, 5),
  ylim = c(0, 2),
  col = "Blue",
  lwd = 2,
  ylab = "Beta Density",
  main = "Shape1 = 1, Shape2 = 2"
)
xcurve = seq(.5, 1, length = 1000)
ycurve = dbeta(xcurve, shape1 = 1, shape2 = 2)
polygon(c(.5, xcurve, 1), c(0, ycurve, 0), col = "Red")
prob = pbeta(1, shape1 = 1, shape2 = 2) - pbeta(.5, shape1 = 1, shape2 = 2)
prob = round(prob, 4)
text(x = 3,
     y = 0.8,
     paste("Area = ", prob, sep = ""))
```

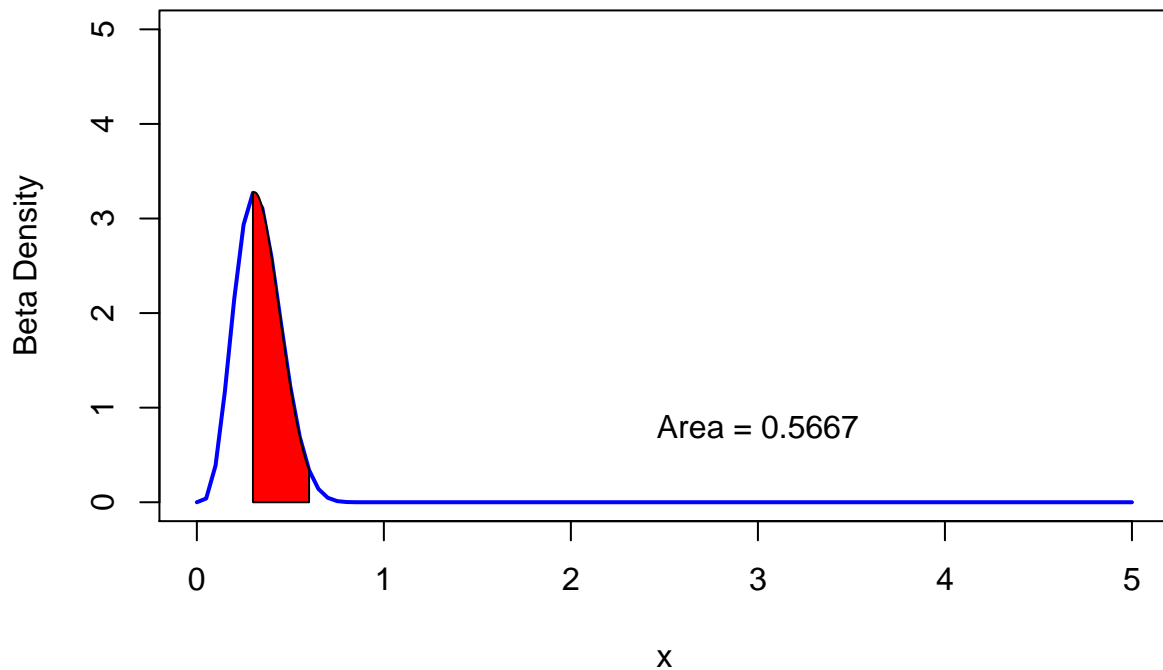
Shape1 = 1, Shape2 = 2



Plot of Beta Density with shape1 = 5 and shape2 = 10 and show probability of .3:.6

```
curve(
  dbeta(x, shape1 = 5, shape2 = 10),
  xlim = c(0, 5),
  ylim = c(0, 5),
  col = "Blue",
  lwd = 2,
  ylab = "Beta Density",
  main = "Shape1 = 5, Shape2 = 10"
)
xcurve = seq(.3, .6, length = 1000)
ycurve = dbeta(xcurve, shape1 = 5, shape2 = 10)
polygon(c(.3, xcurve, .6), c(0, ycurve, 0), col = "Red")
prob = pbeta(.6, shape1 = 5, shape2 = 10) - pbeta(.3, shape1 = 5, shape2 = 10)
prob = round(prob, 4)
text(x = 3,
     y = 0.8,
     paste("Area = ", prob, sep = ""))
```

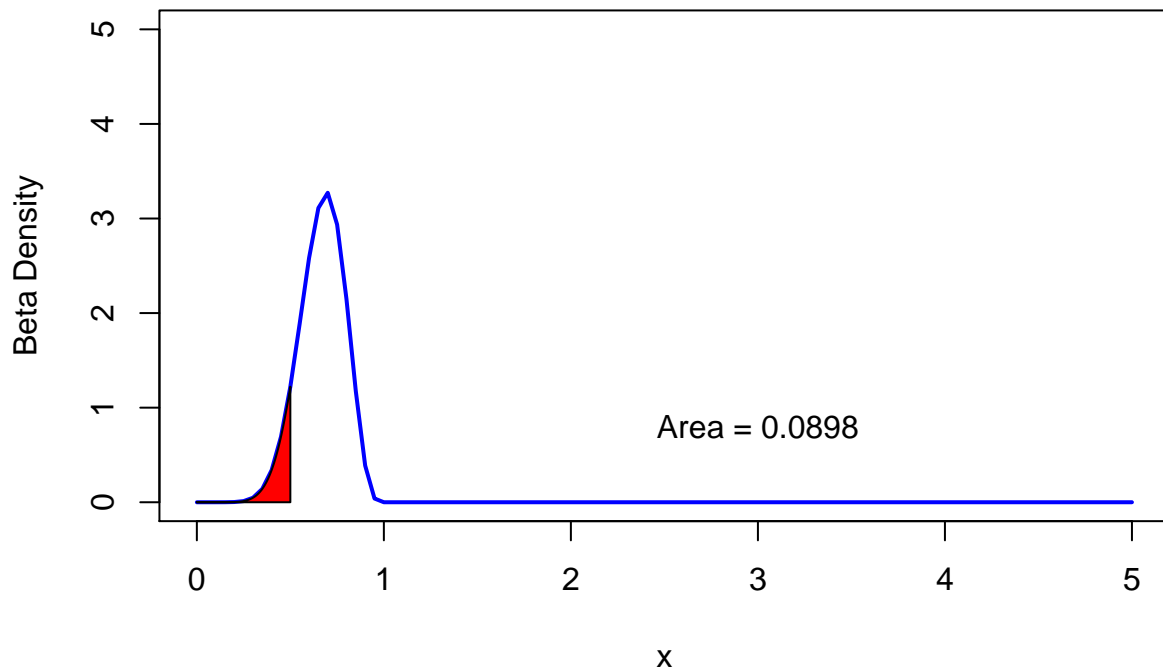
Shape1 = 5, Shape2 = 10



Plot of Beta Density with shape1 = 10 and shape2 = 5 and show probability of 0:.5

```
curve(
  dbeta(x, shape1 = 10, shape2 = 5),
  xlim = c(0, 5),
  ylim = c(0, 5),
  col = "Blue",
  lwd = 2,
  ylab = "Beta Density",
  main = "Shape1 = 10, Shape2 = 5"
)
xcurve = seq(0, .5, length = 1000)
ycurve = dbeta(xcurve, shape1 = 10, shape2 = 5)
polygon(c(0, xcurve, .5), c(0, ycurve, 0), col = "Red")
prob = pbeta(.5, shape1 = 10, shape2 = 5) - pbeta(0, shape1 = 10, shape2 = 5)
prob = round(prob, 4)
text(x = 3,
     y = 0.8,
     paste("Area = ", prob, sep = ""))
```

Shape1 = 10, Shape2 = 5



Task 7

Homemade function to take alpha and beta values to create an exponential plot

```
myexp = function(x, a, b) {  
  (a / b) * '^(2.71828183, -(a * x / b))'  
}  
  
##Show Both plots side by side to compare all x values  
layout(matrix(1:2, nr = 1, nc = 2))  
  
###Gamma->Exponential with 2:3  
curve(  
  myexp(x, 2, 3),  
  xlim = c(0, 5),  
  ylim = c(0, 5),  
  col = "Blue",  
  lwd = 2,  
  ylab = "Gamma->Exponential Density",  
  main = "Alpha = 2, Beta = 3"  
)  
  
###Exponential with rate 2/3
```

```

curve(
  dexp(x, rate = 2 / 3),
  xlim = c(0, 5),
  ylim = c(0, 5),
  col = "Blue",
  lwd = 2,
  ylab = "Exponential Density",
  main = "Rate = 2/3"
)

```

