Continuous Probability Distribution

General continuous distribution

```
f<-function(x) (x^2+1)
Integrate(f,lower=0,upper=5)
```

Normal Distribution

dnorm(Z,mean,sd)

pnorm(Z,mean,sd)

qnorm(Z,mean,sd)

```
pnorm(1)
pnorm(140,45,10)
```

Example

```
data("women")
head(women)
height.mean <- mean(women$height)
height.mean
height.sd <- sd(women$height)
height.sd
height.z <- (women$height - height.mean)/height.sd
x <- 68 # height in cm
x.z <- (x-height.mean)/height.sd # z-transformation
pnorm(x.z)
x <- 68 # height in cm
pnorm(x, mean = height.mean, sd = height.sd, lower.tail = TRUE,
log.p = FALSE)
x <- qnorm(0.6, mean = height.mean, sd = height.sd, lower.tail =
TRUE)
```

Example

```
x <- seq(-10, 10, by = .1)
y <- dnorm(x, mean = 2.5, sd = 0.5)
plot(x,y)
```

```
plot(x,y,type=”l”)
lines(x = x, y = y, col = "blue")
```

Example of standard normal

```
x= seq(-4,4, length = 1000)
y= dnorm(x)
plot(x, y, type="l")
abline(v = 1.96)
```

Exercise

1. For the continuous random variable X, the probability density function given below
$$f(x) = \begin{cases} k(2-x); 0 \le x < 2 \\ kx(x-2); 2 \le x < 3. \\ 0 \ ; \text{ otherwise} \end{cases}$$
Find k and mean of the distribution. Write a R program for the above problem.

2. A daily consumption of electric power (in million kWh) is a random variable X with probability density function given below
$$f(x) = \begin{cases} kxe^{-x/3}, & x > 0 \\ 0 & x \le 0 \end{cases}$$
Find (i) k (ii) expectation of X (iii) Probability that on a given day, the electric consumption is more than expected value. Write a R program for the above problem.

3. A continuous random variable has probability density function
$f(x) = 6(x - x^2),\ 0 \le x \le 1.$
Find mean and variance and also find $P\left(\left|x - \mu\right| < \sigma\right)$. Write a R program for the above problem.

4. In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find
   i. How many students score between 12 and 15?
   ii. How many score above 18?
   iii. How many score below 8?

   Write a R program for the above problem. Also plot the graph for each case.

5. In a male population of 1000, the mean height is 68.16 inches and standard deviation is 3.2 inches. How many men may be more than 6 feet (72 inches)?
Write a R program for the above problem. Also plot the graph.

6. A manufacturer of envelopes known that the weight of the envelopes is normally distributed with mean 1.9 gm and variance 0.01 gm. Find how many envelops weighting (i) 2 gm or more (ii) 2.1 gm or more can be expected in a given packet of 1000 envelopes. Write a R program for the above problem. Also plot the graph.