real_hw

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연습문제2

5번

```
x<-c(seq(1,100))
x[x>=70]
```

```
##  [1]  70  71  72  73  74  75  76  77  78  79  80  81  82  83  84  85  86
## [18]  87  88  89  90  91  92  93  94  95  96  97  98  99 100
```

6번

```
income<-c(45,23,55,34,53,66,76,86,88)
income[4] # 4번째 값
```

```
## [1] 34
```

```
income[1:3] # 첫번째부터 3번째 값
```

```
## [1] 45 23 55
```

```
income[-c(1,5,6)] # 1,5,6 번째 값을 제외한 나머지
```

```
## [1] 23 55 34 76 86 88
```

```
income[income<=50] # income이 50이하인 값만 추출
```

```
## [1] 45 23 34
```

9번

```
A <- matrix(c(2,-1,0,2,1,3),byrow=TRUE,nrow=2)
B <- matrix(c(2,3,1,1,2,3),byrow=T,nrow=2)
C <- matrix(c(1,-1,2,1),byrow=T,nrow=2)
(A+B)
```

```
##      [,1] [,2] [,3]
## [1,]    4    2    1
## [2,]    3    3    6
```

```
C %*% B
```

```
##      [,1] [,2] [,3]
## [1,]    1    1   -2
## [2,]    5    8    5
```

14번

```
data<-read.table('D:/Linear_Algebra/INU_hw/R_HW_data/data.txt',header=T) # 메모장 ansi로 저장
data$edu # edu의 값
```

```
##  [1] 대졸 중졸 고졸 중졸 고졸 대졸 대졸 대졸 고졸 중졸
## Levels: 고졸 대졸 중졸
```

```
data[5,] # 5행
```

```
##   Sex  edu age income
## 5  여 고졸  48    105
```

```
nrow(data) # 표본 개수
```

```
## [1] 10
```

```
ncol(data) # 변수 개수
```

```
## [1] 4
```

```
female <- data[data$Sex=='여',] # 여자만 선택해서 female 데이터 프레임 만들기
people<-data[data$age<40,]
```

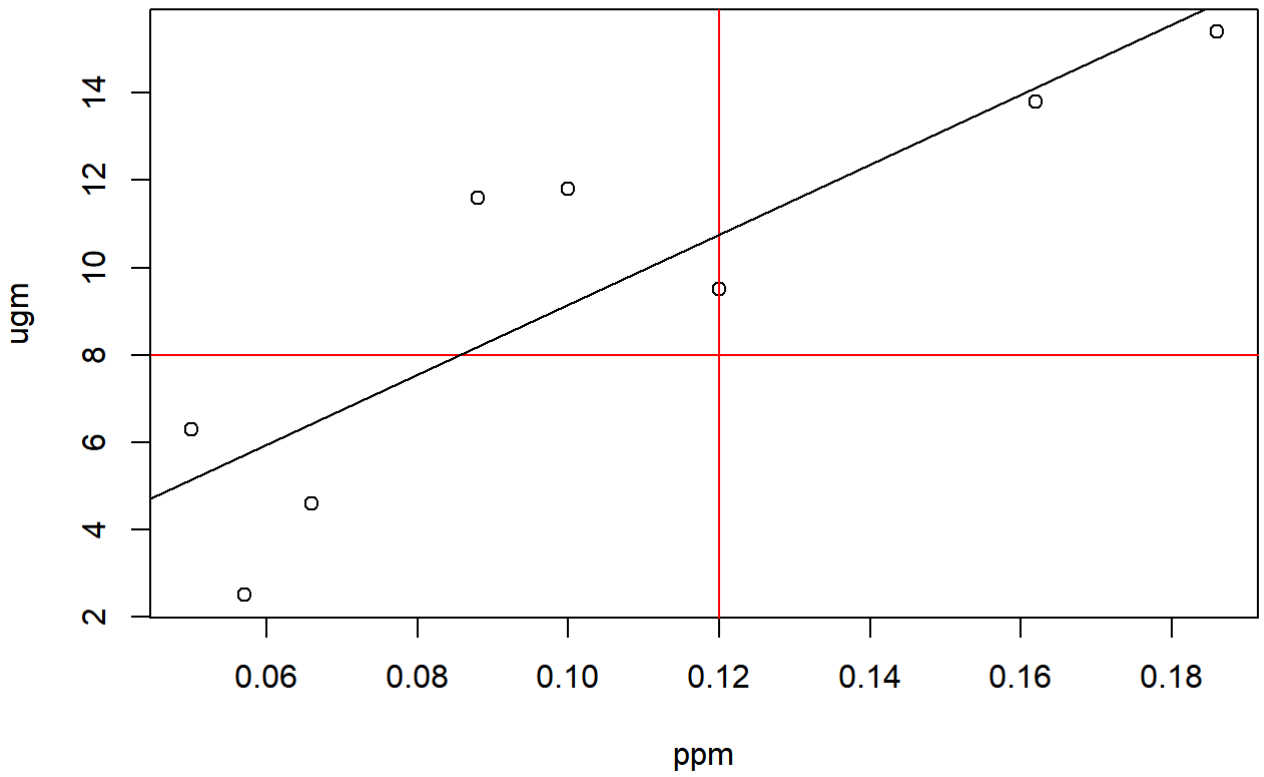
16번

```
x<-matrix(c(11,42,55,2,1,6),nrow=2,byrow=TRUE)
y<-matrix(c(1,4,5,6,7,6),nrow=2,byrow=TRUE)
cbind(x,y)
```

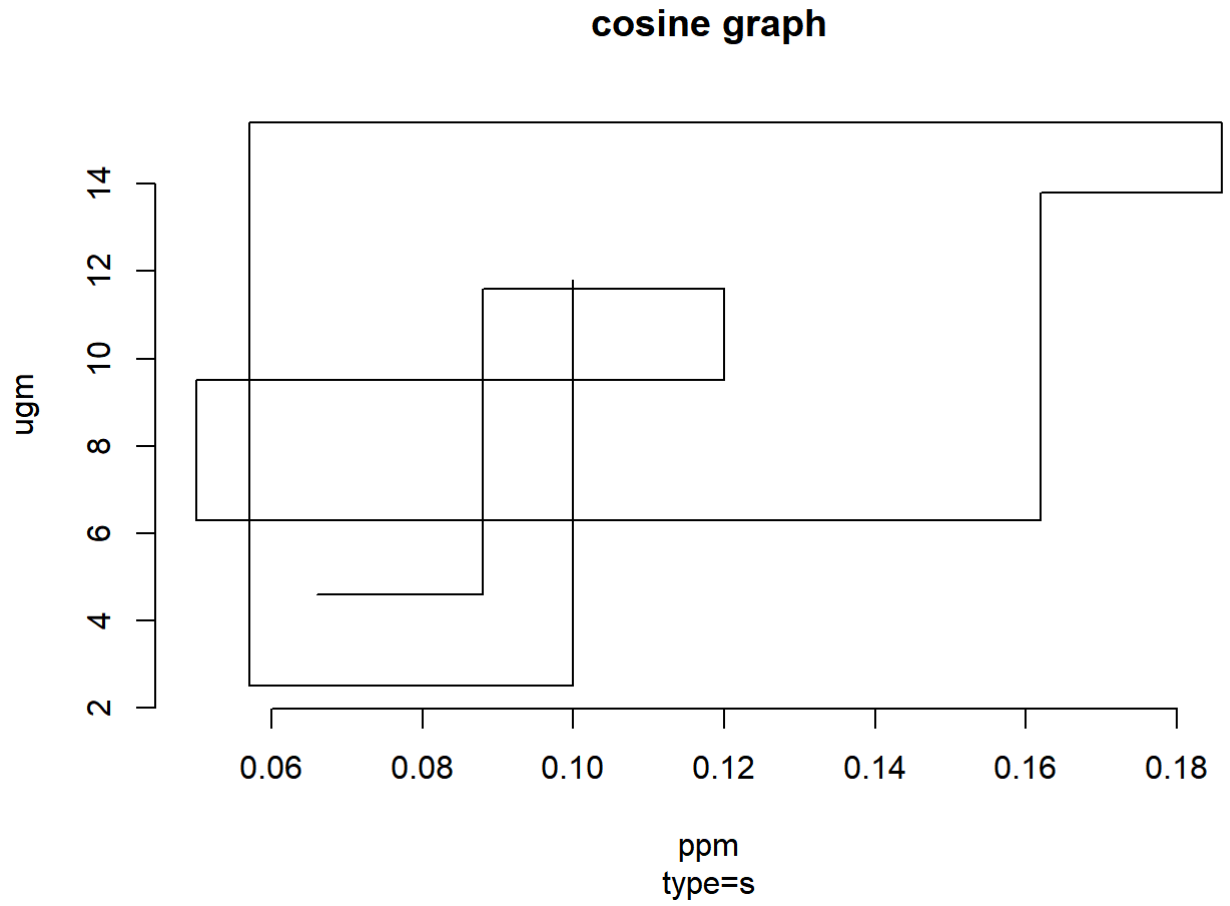
```
##      [,1] [,2] [,3] [,4] [,5] [,6]
## [1,]   11   42   55    1    4    5
## [2,]    2    1    6    6    7    6
```

예제 3.7

```
ppm<-c(0.066,0.088,0.12,0.05,0.162,0.186,0.057,0.1) # 오존 농도 데이터
ugm<-c(4.6,11.6,9.5,6.3,13.8,15.4,2.5,11.8) # 제 2탄소농도 데이터
plot(ppm,ugm) # 그래프 그리기
abline(h=8,col='red') # 수평선
abline(v=0.12,col='red') # 수직선
lm.line<-lm(ugm~ppm) # 회귀분석
abline(lm.line) # 회귀선
```



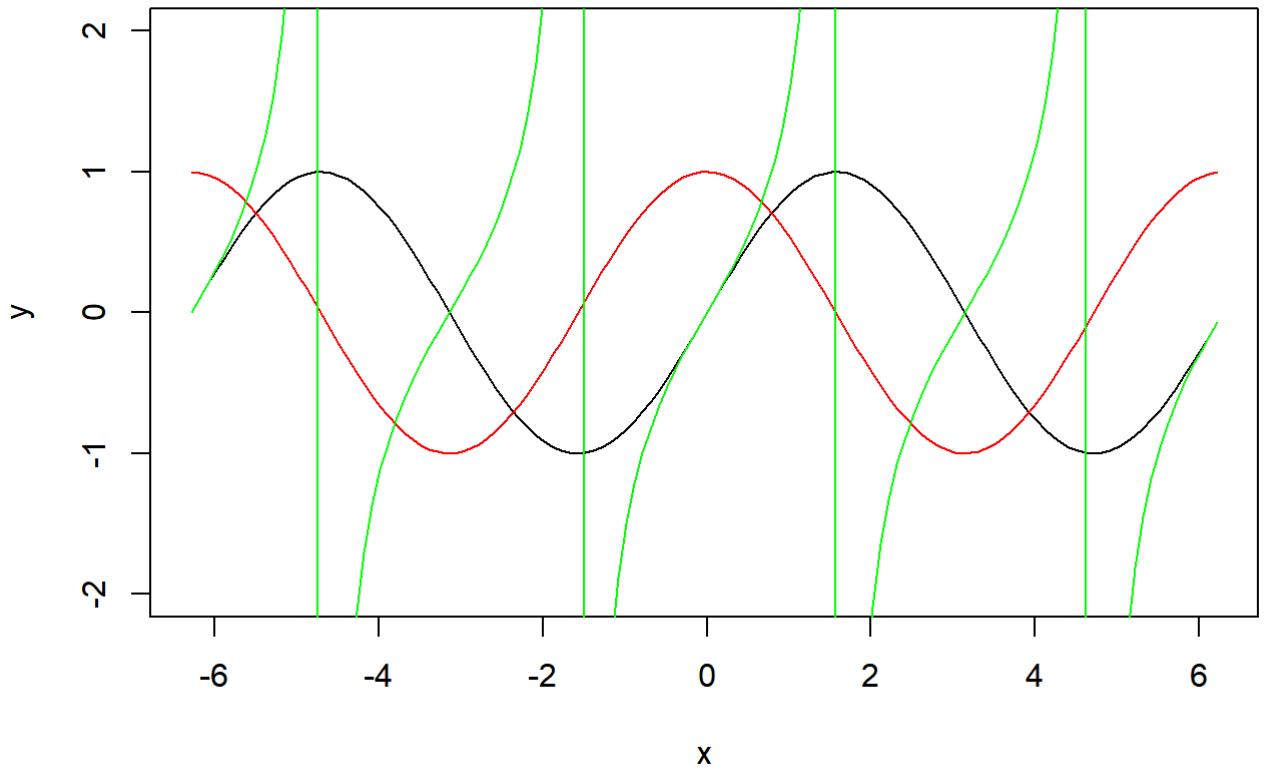

```
plot(ppm,ugm,type='s',bty='n',main='cosine graph',sub='type=s') # 계단형타입
```



연습문제3

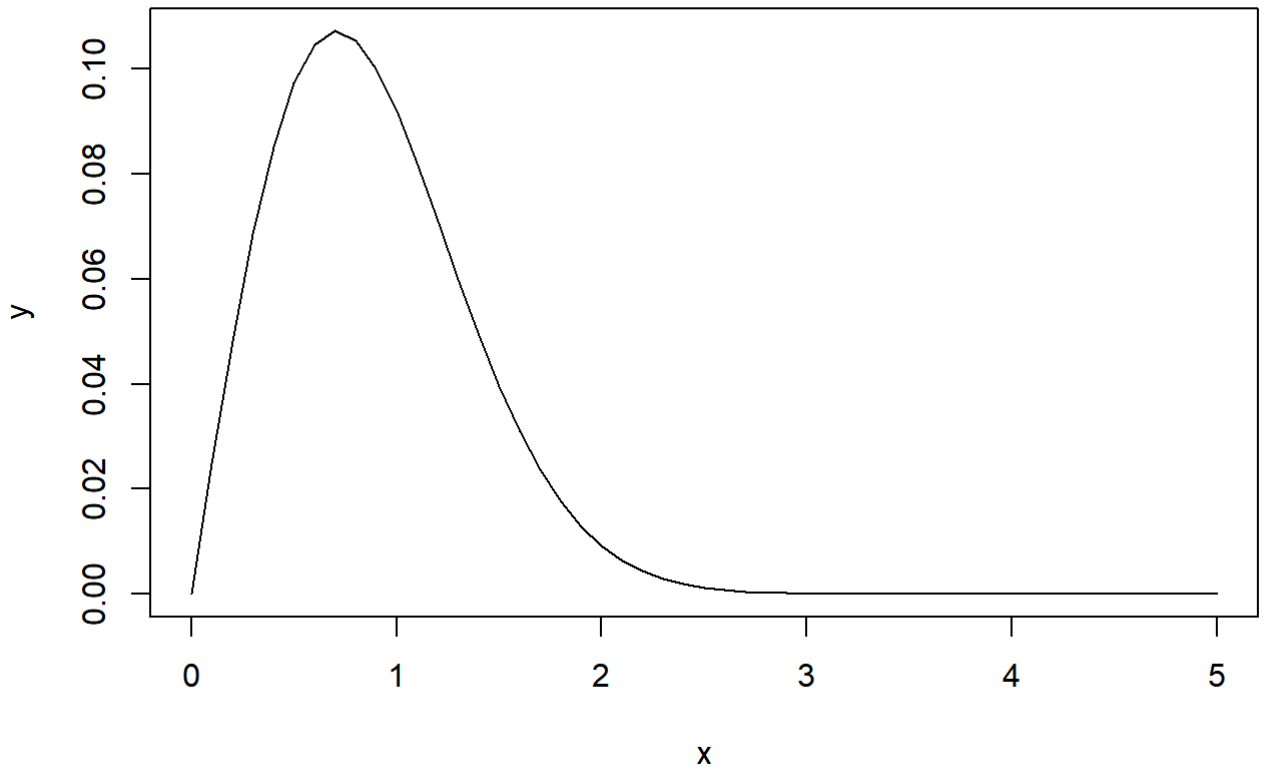
3번

```
x<-seq(-2*pi,2*pi,0.1)
ysin<-sin(x)
ycos<-cos(x)
ytan<-tan(x)
plot(x,ysin,type='l',ylab='y',ylim=c(-2,2))
lines(x,ycos,type='l',col='red')
lines(x,ytan,type='l',col='green')
```



5번

```
x<-seq(0,5,by=0.1)
y<-1/4*x*exp(-x^2)
plot(x,y,type='l')
```



8번

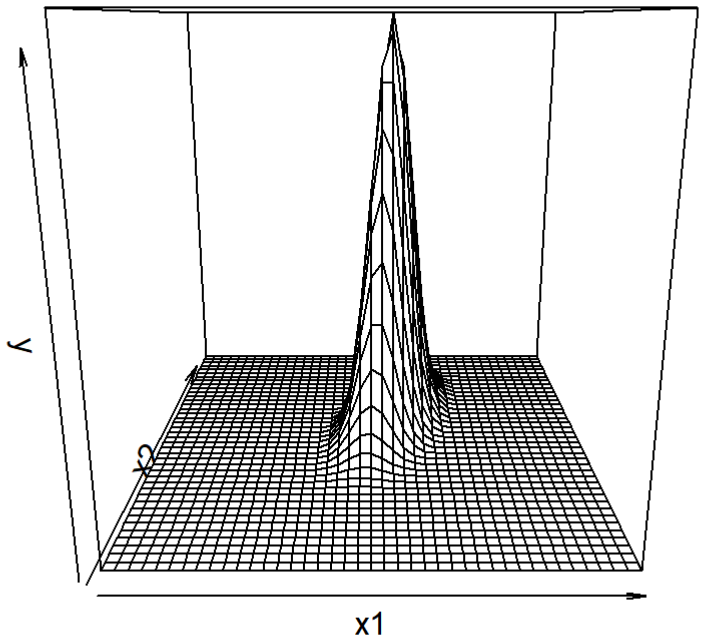
```
data(mtcars)
#install.packages('rgl')
library(rgl)
```

```
## Warning: package 'rgl' was built under R version 3.6.3
```

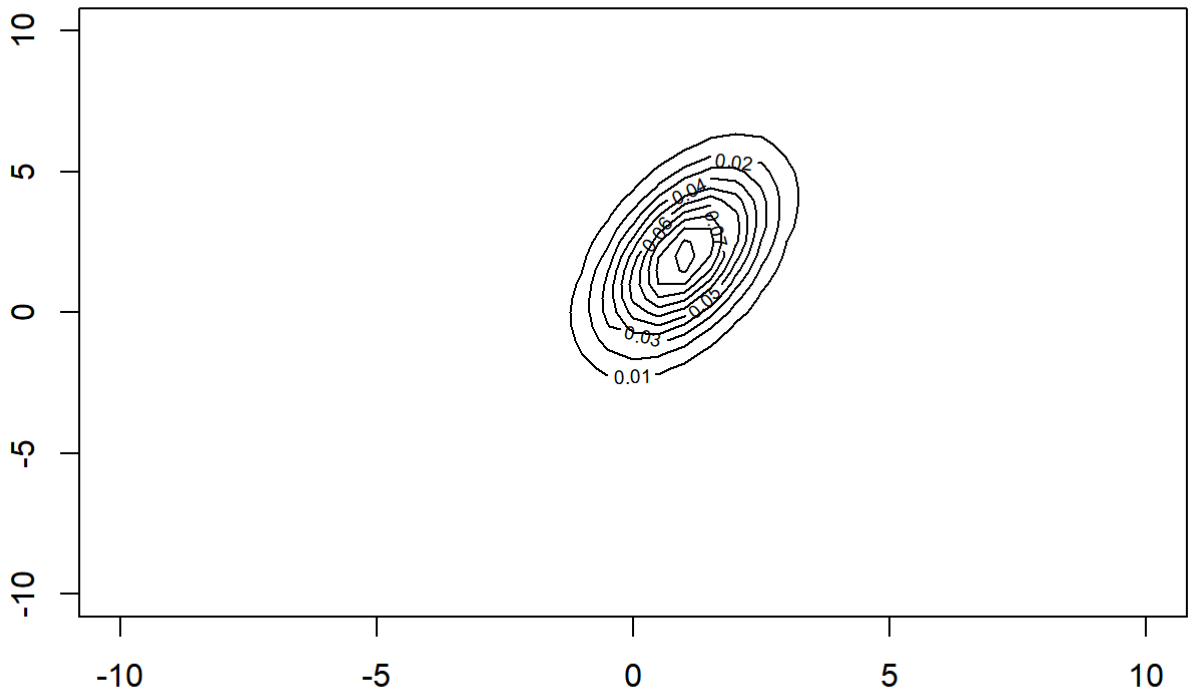
```
plot3d(mtcars$mpg,mtcars$hp,mtcars$drat)
text3d(mtcars$mpg,mtcars$hp,mtcars$drat,texts=rownames(mtcars),col='red',adj=1)
```

10번

```
x1<-seq(-10,10,b=0.5)
x2<-seq(-10,10,b=0.5)
mu1<-1; mu2<-2; s1<-1; s2<- 4; r<-0.5;
func<-function(x1,x2){
  pro1 <- 1/(2*pi*sqrt(s1*s2)*(1-r^2))
  pro2 <- ((x1-mu1)/sqrt(s1))^2
  pro3<- (2*r*(x1-mu1)*(x2-mu2))/sqrt(s1*s2)
  pro4 <-((x2-mu2)/sqrt(s2))^2
  pro5 <- (pro2-pro3+pro4)
  pro6<- pro1*exp(-pro5/(2*(1-r^2)))
}
y<-outer(x1,x2,FUN=func)
persp(x1,x2,y)
```




```
contour(x1,x2,y)
```



11번

11-1

```
score<-read.csv('D:WWLinear_AlgebraWWINU_hwWWdata.csv',header = T,fileEncoding = "euc-kr")
freq<-table(score[,4])
freq
```

```
##
## 1 2 3 4
## 7 6 4 3
```

```
(prob<-prop.table(freq)) # 상대도수
```

```
##
##    1    2    3    4
## 0.35 0.30 0.20 0.15
```

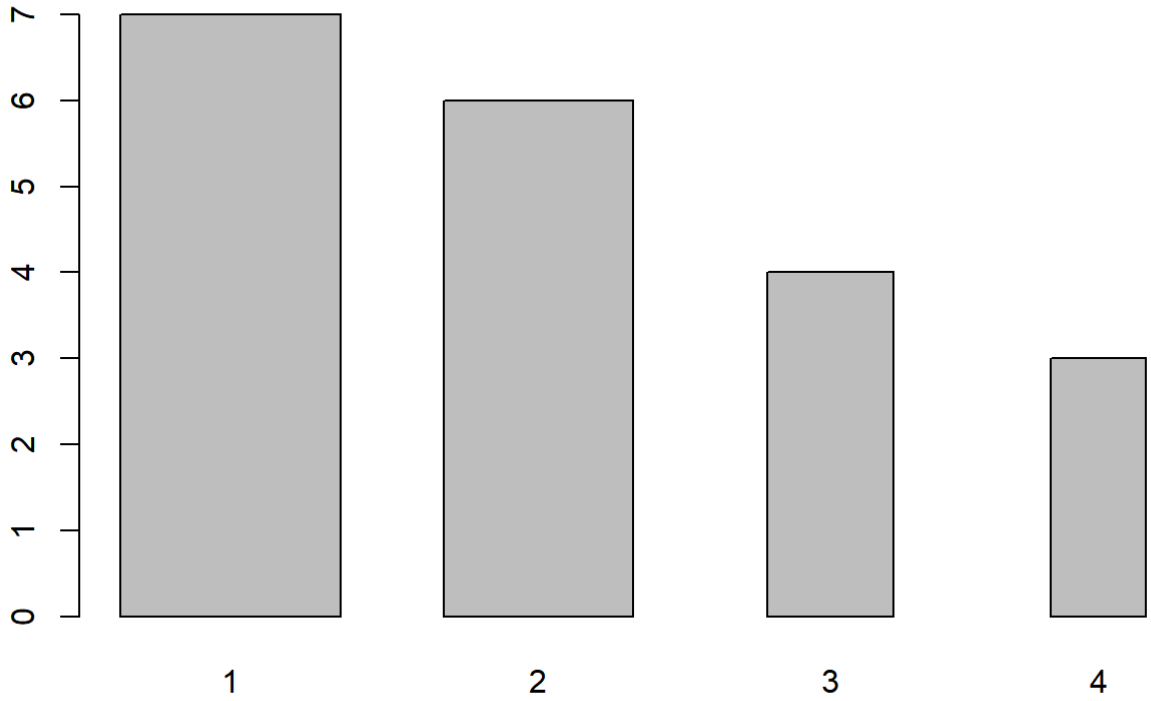
```
(sum_prob<-cumsum(prob)) # 누적도수
```

```
##    1    2    3    4
## 0.35 0.65 0.85 1.00
```

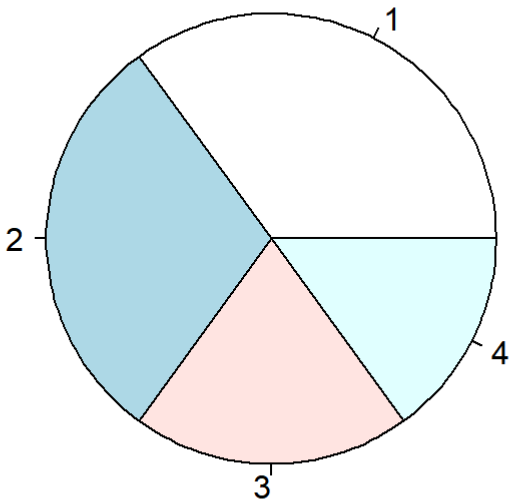
```
(total <- cbind(freq,prob,sum_prob))
```

```
##   freq prob sum_prob
## 1    7 0.35     0.35
## 2    6 0.30     0.65
## 3    4 0.20     0.85
## 4    3 0.15     1.00
```

```
barplot(freq,prob,sum_prob)
```




```
pie(freq)
```

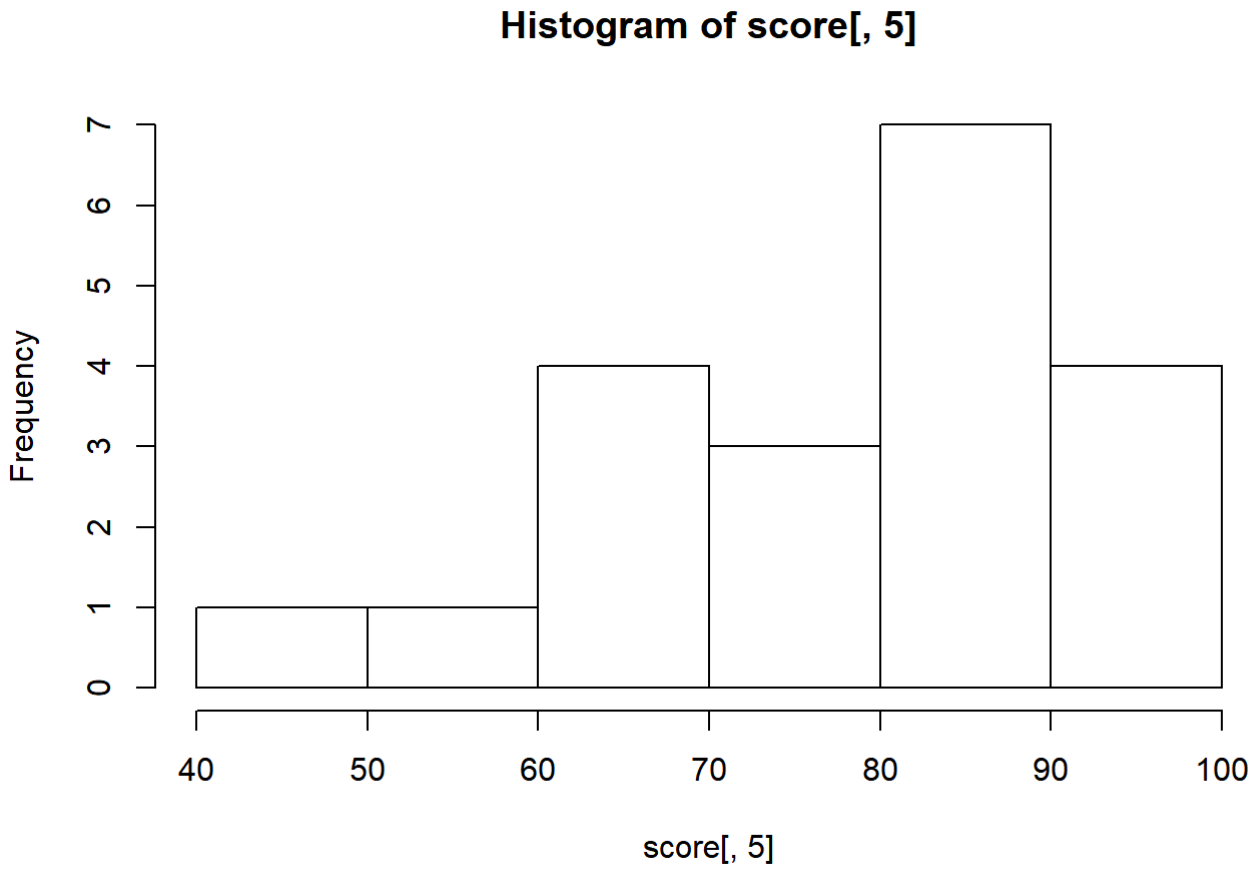


11-2

```
stem(score[,5],scale=2) # 줄기 잎 그림
```

```
##
##   The decimal point is 1 digit(s) to the right of the |
##
##   4 | 4
##   5 | 2
##   6 | 8888
##   7 | 46
##   8 | 0357889
##   9 | 01355
```

```
hist(score[,5])
```



11-3

```
x<-score[,5];y<-score[,7]
min(x) # 최소
```

```
## [1] 44
```

```
max(x) # 최대
```

```
## [1] 95
```

```
mean(x) # 평균
```

```
## [1] 79.025
```

```
var(x) # 분산
```

```
## [1] 199.723
```

```
median(x) # 중앙값
```

```
## [1] 83.75
```

```
min(y) # 최소
```

```
## [1] 18
```

```
max(y) # 최대
```

```
## [1] 65
```

```
mean(y) # 평균
```

```
## [1] 40.05
```

```
var(y) # 분산
```

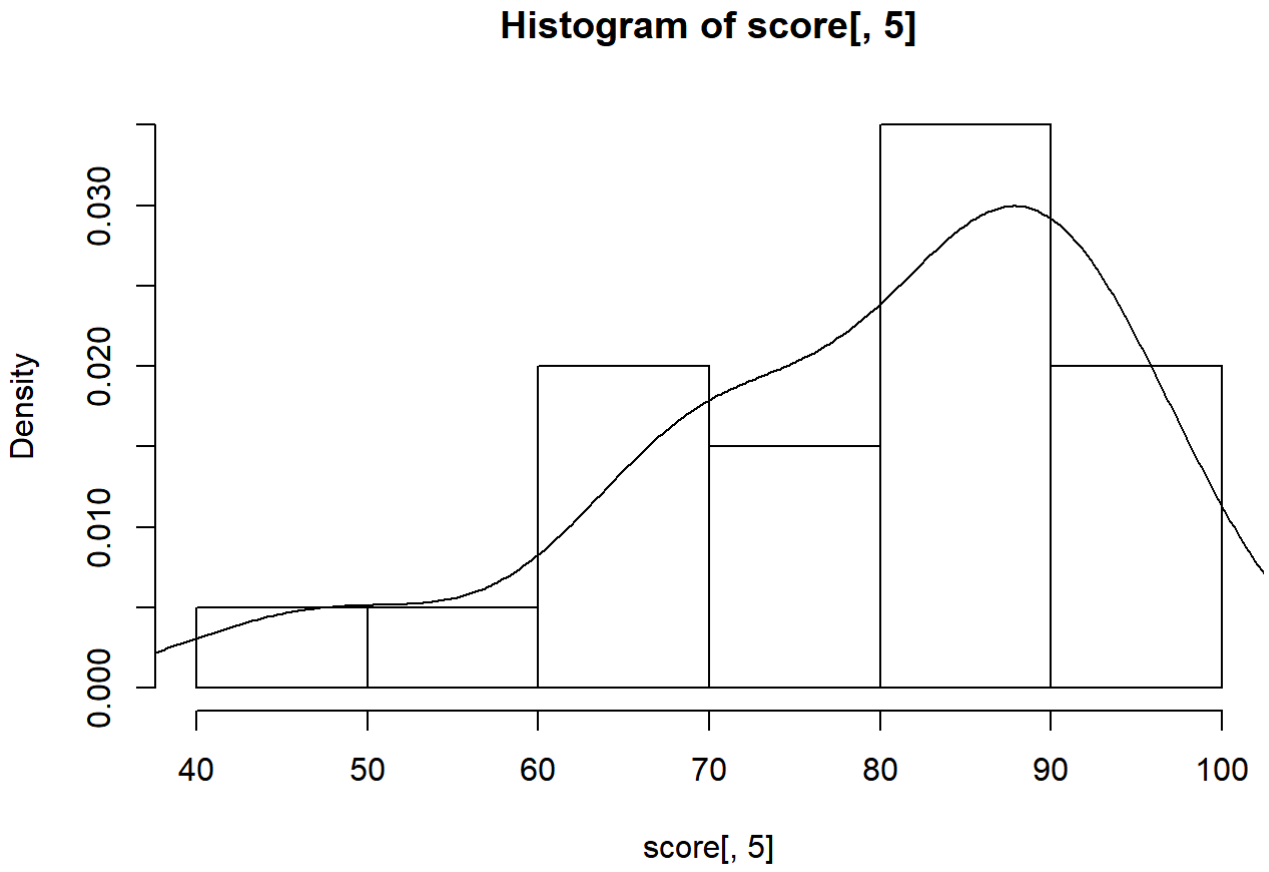
```
## [1] 132.9974
```

```
median(y) # 중앙값
```

```
## [1] 40
```

11-4

```
hist(score[,5],probability = T) # 밀도 히스토그램
lines(density(score[,5]))
```


Histogram of score[, 5]
Density
0.000
0.010
0.020
0.030
40
50
60
70
80
90
100
score[, 5]