hw01

2022-03-18

##기초통계

```
x <- c(18,21,22,25,26,27,29,30,31,33,36,37,41,42,47,52,55,57,58,62,64,67,69,71,72,73,74,76,77)


#수상자수
length(x)
```

```
## [1] 29
```

```
#나이의 평균
mean(x)
```

```
## [1] 48
```

```
#나이의 표준편차
sd(x)
```

```
## [1] 19.67595
```

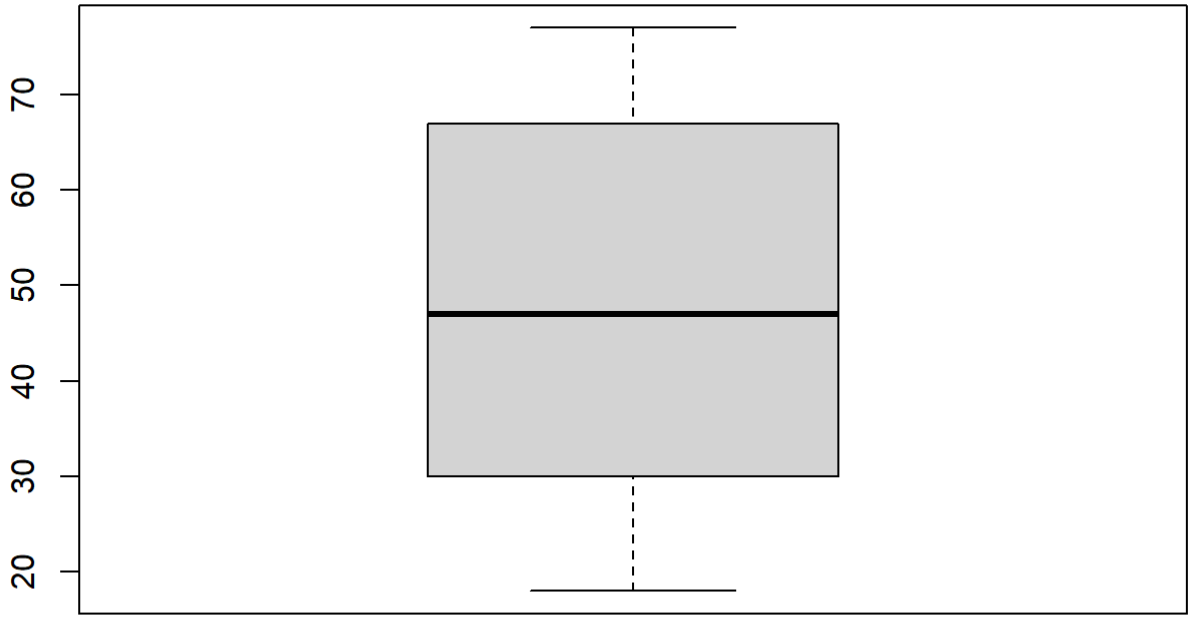
```
#나이의 분산
var(x)
```

```
## [1] 387.1429
```

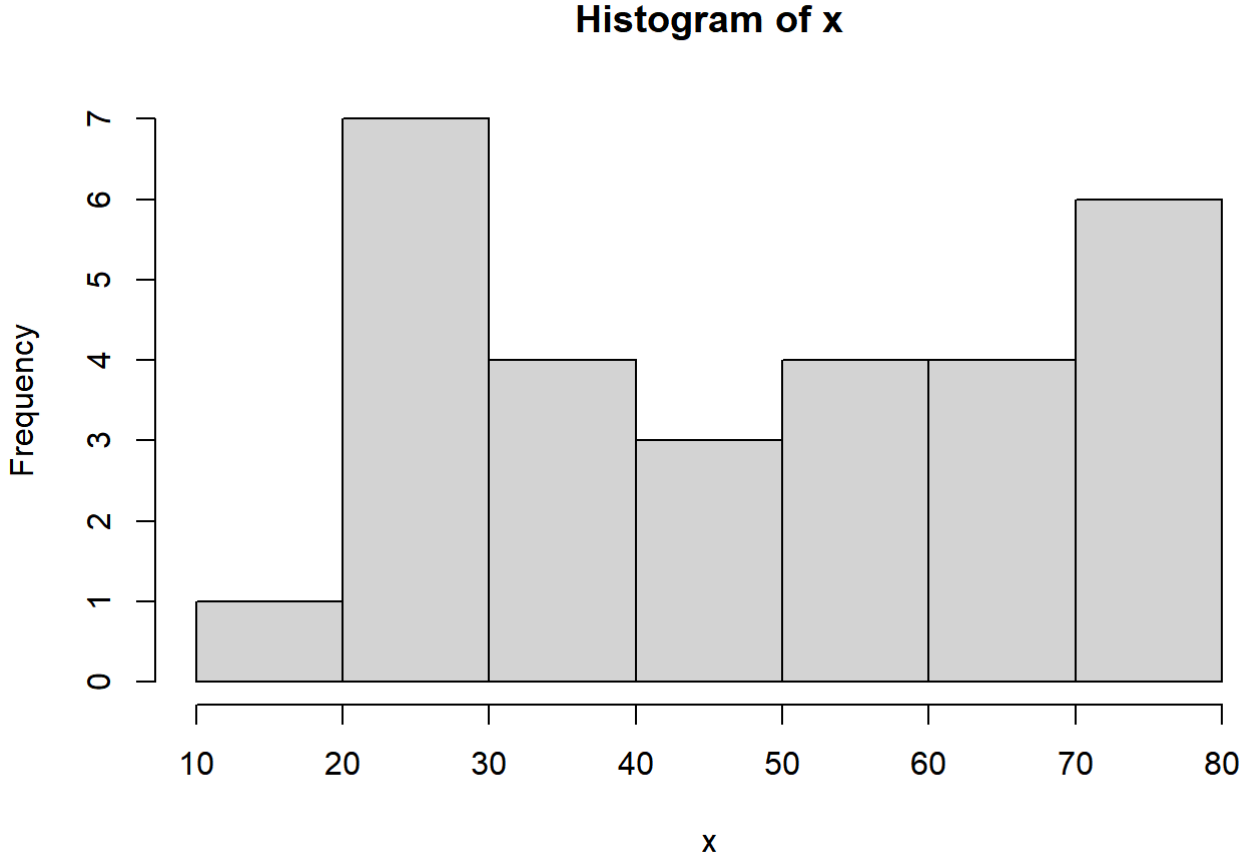
```
#나이의 줄기와 잎 그림
stem(x)
```

```
##
##   The decimal point is 1 digit(s) to the right of the |
##
##   1 | 8
##   2 | 125679
##   3 | 01367
##   4 | 127
##   5 | 2578
##   6 | 2479
##   7 | 123467
```

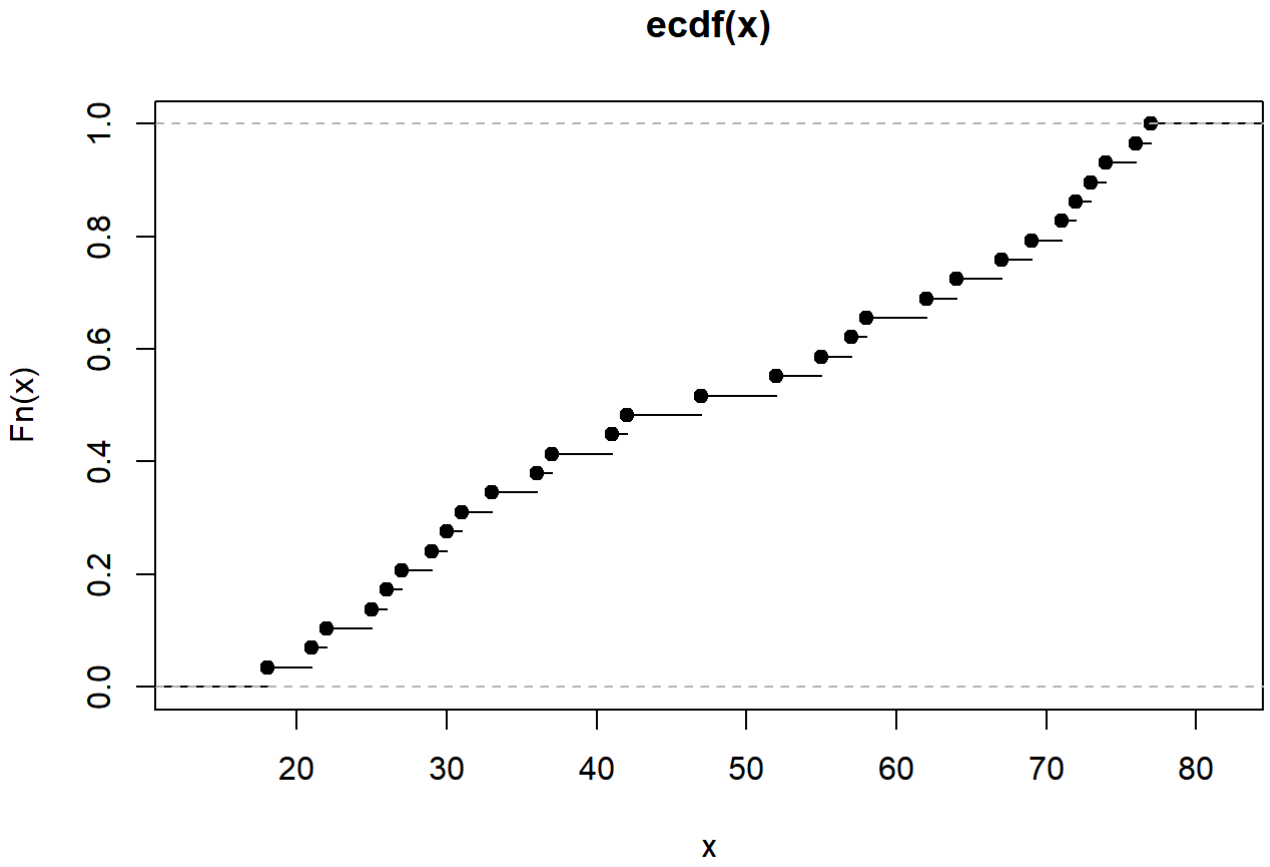
```
#나이의 상자그림
boxplot(x)
```




```
#나이의 히스토그램
hist(x)
```



```
#나이의 누적분포함수
plot(ecdf(x))
```




```
# 나이의 0%,25%,50%,75%,100% 백분위수
quantile(x,prob=seq(0,1,by=0.25))
```

```
##   0%  25%  50%  75% 100%
##   18   30   47   67   77
```

##R 수학함수

```
exp(x) #지수함수
```

```
##  [1] 6.565997e+07 1.318816e+09 3.584913e+09 7.200490e+10 1.957296e+11
##  [6] 5.320482e+11 3.931334e+12 1.068647e+13 2.904885e+13 2.146436e+14
## [11] 4.311232e+15 1.171914e+16 6.398435e+17 1.739275e+18 2.581313e+20
## [16] 3.831008e+22 7.694785e+23 5.685720e+24 1.545539e+25 8.438357e+26
## [21] 6.235149e+27 1.252363e+29 9.253782e+29 6.837671e+30 1.858672e+31
## [26] 5.052394e+31 1.373383e+32 1.014800e+33 2.758513e+33
```

```
log(x) #자연로그 함수
```

```
##  [1] 2.890372 3.044522 3.091042 3.218876 3.258097 3.295837 3.367296 3.401197
##  [9] 3.433987 3.496508 3.583519 3.610918 3.713572 3.737670 3.850148 3.951244
## [17] 4.007333 4.043051 4.060443 4.127134 4.158883 4.204693 4.234107 4.262680
## [25] 4.276666 4.290459 4.304065 4.330733 4.343805
```

```
log10(x) #상용로그 함수
```

```
##  [1] 1.255273 1.322219 1.342423 1.397940 1.414973 1.431364 1.462398 1.477121
##  [9] 1.491362 1.518514 1.556303 1.568202 1.612784 1.623249 1.672098 1.716003
## [17] 1.740363 1.755875 1.763428 1.792392 1.806180 1.826075 1.838849 1.851258
## [25] 1.857332 1.863323 1.869232 1.880814 1.886491
```

```
factorial(x) #팩토리얼
```

```
##  [1]  6.402374e+15  5.109094e+19  1.124001e+21  1.551121e+25  4.032915e+26
##  [6]  1.088887e+28  8.841762e+30  2.652529e+32  8.222839e+33  8.683318e+36
## [11]  3.719933e+41  1.376375e+43  3.345253e+49  1.405006e+51  2.586232e+59
## [16]  8.065818e+67  1.269640e+73  4.052692e+76  2.350561e+78  3.146997e+85
## [21]  1.268869e+89  3.647111e+94  1.711225e+98 8.504786e+101 6.123446e+103
## [26] 4.470115e+105 3.307885e+107 1.885495e+111 1.451831e+113
```

```
choose(length(x),11) #조합
```

```
## [1] 34597290
```

```
sin(x) #삼각함수
```

```
##  [1] -0.750987247  0.836655639 -0.008851309 -0.132351750  0.762558450
##  [6]  0.956375928 -0.663633884 -0.988031624 -0.404037645  0.999911860
## [11] -0.991778853 -0.643538133 -0.158622669 -0.916521548  0.123573123
## [16]  0.986627592 -0.999755173  0.436164755  0.992872648 -0.739180697
## [21]  0.920026038 -0.855519979 -0.114784814  0.951054653  0.253823363
## [26] -0.676771957 -0.985146260  0.566107637  0.999520159
```

```
cos(x)
```

```
##  [1]  0.66031671 -0.54772926 -0.99996083  0.99120281  0.64691932 -0.29213881
##  [7] -0.74805753  0.15425145  0.91474236 -0.01327675 -0.12796369  0.76541405
## [13] -0.98733928 -0.39998531 -0.99233547 -0.16299078  0.02212676  0.89986683
## [19]  0.11918014  0.67350716  0.39185723 -0.51776980  0.99339038 -0.30902273
## [25] -0.96725059 -0.73619272  0.17171734  0.82433133 -0.03097503
```

```
tan(x)
```

```
##  [1]  -1.137313712  -1.527498528   0.008851656  -0.133526407   1.178753554
##  [6]  -3.273703800   0.887142844  -6.405331197  -0.441695568 -75.313014800
## [11]   7.750470906  -0.840771255   0.160656699   2.291387992  -0.124527568
## [16]  -6.053272383 -45.183087911   0.484699227   8.330856852  -1.097509779
## [21]   2.347860309   1.652317264  -0.115548546  -3.077620403  -0.262417378
## [26]   0.919286404  -5.737022539   0.686747689 -32.268575776
```

##R 분포함수 #이산형분포

분포	확률질량함수	값	평균	분산
베르누이분포 $X\ B(1,p)$	$p^x\,q^{1-x}$	$x=0,1$	p	pq
이항분포 $X\ B(n,p)$	$\binom{n}{k}p^x\,q^{1-x}$	$x=0,1..,n$	np	npq

#연속형분포

분포	dxxx: 확률밀도함수	pxxx:(누적)분포함수	qxxx:백분위함수	rxxx:표본생성함수
정규분포	dnorm(x,mean=0,sd=1)	pnorm(q, mean=0, sd=1)	qnorm(p, mean=0, sd=1)	rnorm(n, mean=0, sd=1)
카이제곱분포	dchisq(x,df)	pchisq(q,df)	qchisq(p,df)	rchisq(n,df)
T분포	dt(x,df)	pt(q,df)	qt(p,df)	rt(n,df)
F분포	df(x,df1,df2)	pf(q,df1,df2)	qf(p,df1,df2)	rf(n,df1,df2)

#정규분포

```
pnorm(0)
```

```
## [1] 0.5
```

```
pnorm(1.96)
```

```
## [1] 0.9750021
```

```
pnorm(1.645)
```

```
## [1] 0.9500151
```

```
qnorm(0.975)
```

```
## [1] 1.959964
```

```
qnorm(0.95)
```

```
## [1] 1.644854
```

#IQ가 430이상이 될 확률

```
1-pnorm(145,mean=15,sd=3)
```

```
## [1] 0
```

```
1-pnorm((145-100/15))
```

```
## [1] 0
```

#남자키 9등급 분류

```
#1등급 상위 4%
qnorm(0.96,mean=173.8,sd=5.83)
```

```
## [1] 184.0065
```

```
#2등급 상위 11%
qnorm(0.89,mean=173.8,sd=5.83)
```

```
## [1] 180.9507
```

```
#3등급 상위 23%
qnorm(0.77,mean=173.8,sd=5.83)
```

```
## [1] 178.1075
```

```
#4등급 상위 40%
qnorm(0.60,mean=173.8,sd=5.83)
```

```
## [1] 175.277
```

```
#5등급 상위 60%
qnorm(0.5,mean=173.8,sd=5.83)
```

```
## [1] 173.8
```

```
#6등급 상위 77%
qnorm(0.23,mean=173.8,sd=5.83)
```

```
## [1] 169.4925
```

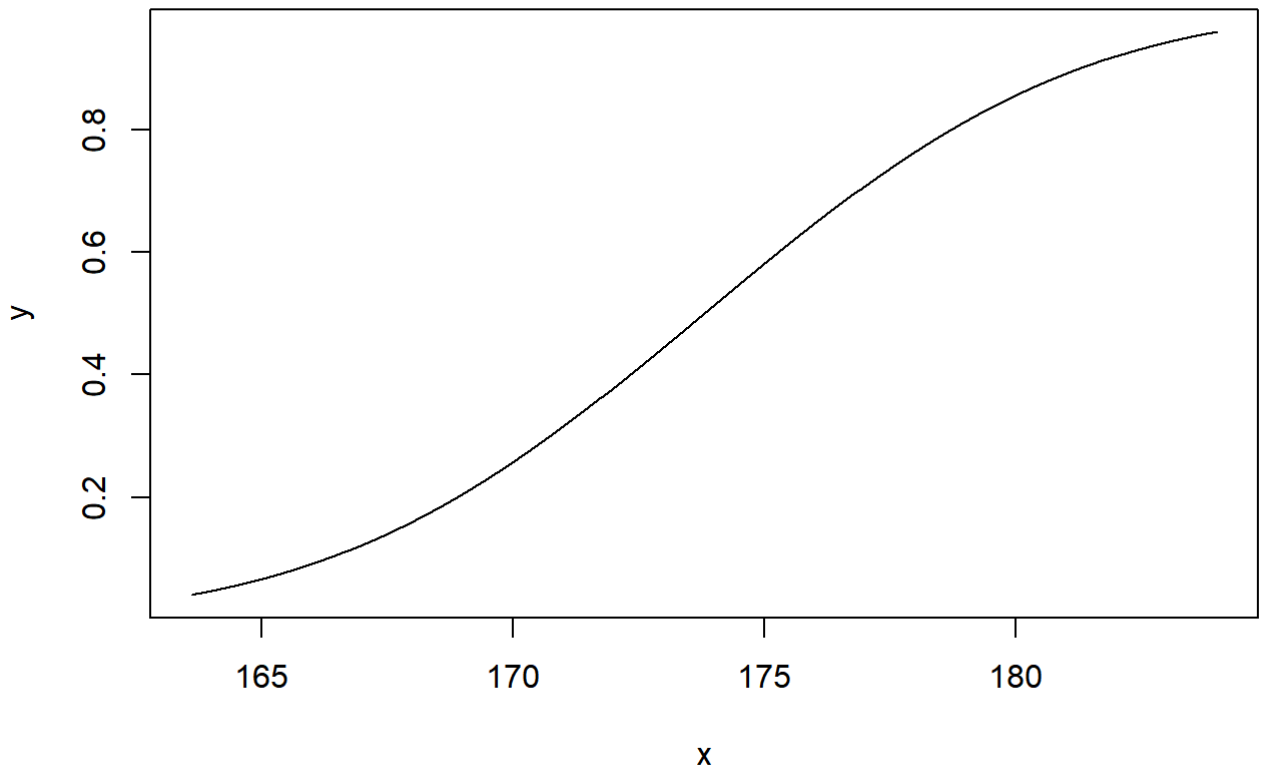
```
#7등급 상위 89%
qnorm(0.11,mean=173.8,sd=5.83)
```

```
## [1] 166.6493
```

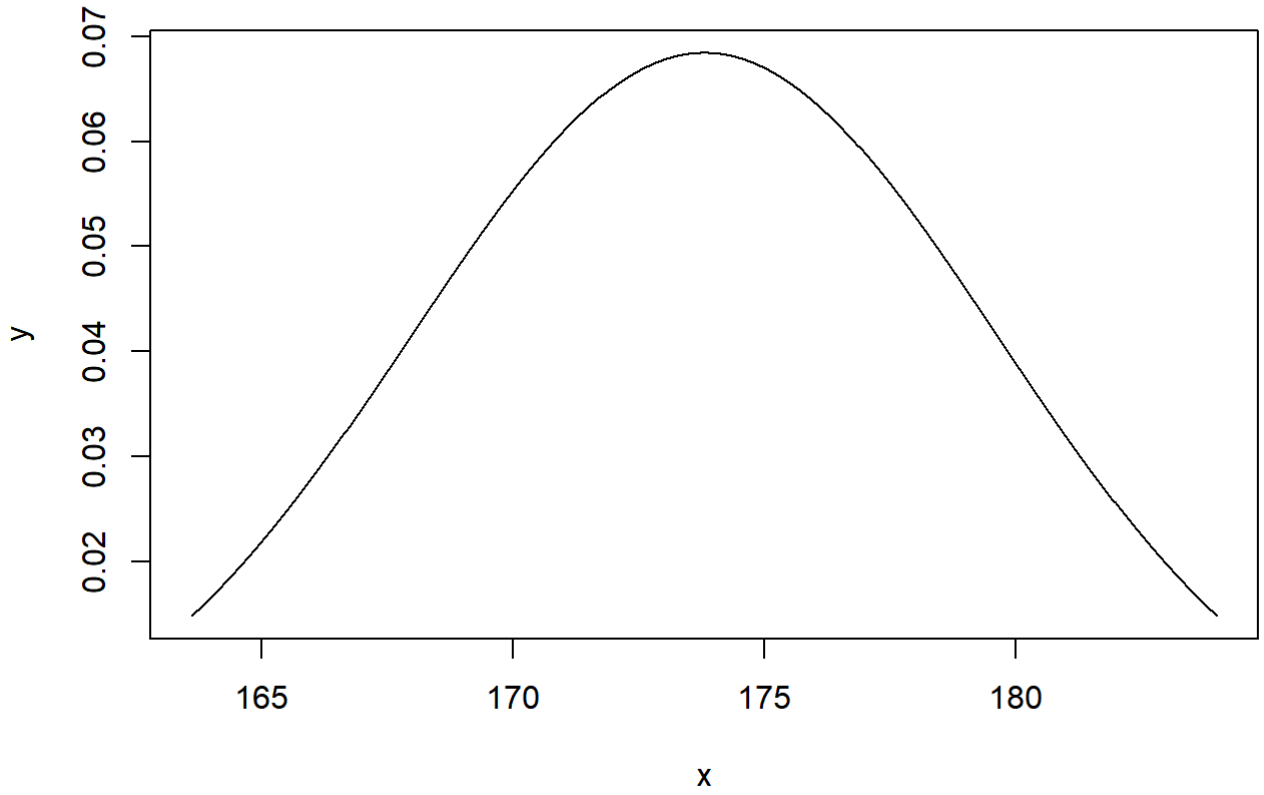
```
#8등급 상위 96%
qnorm(0.04,mean=173.8,sd=5.83)
```

```
## [1] 163.5935
```

```
x=ht = seq(163.6,184,0.02)
y=pnorm(ht,mean=173.8,sd=5.83)
plot(x,y,type="l")
```




```
x=ht = seq(163.6,184,0.02)
y=dnorm(ht,mean=173.8,sd=5.83)
plot(x,y,type="l")
```



#여자키 9등급 분류

```
#1등급 상위 4%
qnorm(0.96,mean=160.7,sd=4.94)
```

```
## [1] 169.3484
```

```
#2등급 상위 11%
qnorm(0.89,mean=160.7,sd=4.94)
```

```
## [1] 166.759
```

```
#3등급 상위 23%
qnorm(0.77,mean=160.7,sd=4.94)
```

```
## [1] 164.3499
```

```
#4등급 상위 40%
qnorm(0.60,mean=160.7,sd=4.94)
```

```
## [1] 161.9515
```

```
#5등급 상위 60%
qnorm(0.5,mean=160.7,sd=4.94)
```

```
## [1] 160.7
```

```
#6등급 상위 77%
qnorm(0.23,mean=160.7,sd=4.94)
```

```
## [1] 157.0501
```

```
#7등급 상위 89%
qnorm(0.11,mean=160.7,sd=4.94)
```

```
## [1] 154.641
```

```
#8등급 상위 96%
qnorm(0.04,mean=160.7,sd=4.94)
```

```
## [1] 152.0516
```