# 20210326

```
#####109 學年度第二學期R 語言#####
####2021/03/26####
## set environment & import data
setwd("C:/Users/User/Desktop/R/R-project/R Statistics/data")
babies <- read.table("babies.txt", header = T)

## 單樣本統計推論
b <- babies$bwt
fivenum(b)

## [1]  55.0 108.5 120.0 131.0 176.0

summary(b)

##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    55.0   108.8   120.0   119.6   131.0   176.0

# 可以自訂函數一次算出更多敘述統計值
my.desc <- function(b){
  b.desc <- c(length(b), summary(b), var(b), sum(b),
              sqrt(var(b)), IQR(b))
  names(b.desc) = c("樣本數", "最小值", "Q1", "中位數",
                    "平均數", "Q3", "最大值", "變異數",
                    "總和", "標準差", "IQR")
  return(b.desc)
}
my.desc(b)

##       樣本數       最小值            Q1       中位數       平均數
     Q3
##   1236.00000     55.00000    108.75000    120.00000    119.57686
131.00000
##       最大值       變異數          總和       標準差           IQR
##    176.00000    332.56818 147797.00000     18.23645     22.25000

sd(b)

## [1] 18.23645

# 計算眾數
table(b)

## b
##  55  58  62  63  65  68  69  71  72  73  75  77  78  79  80  81  82
 83  84  85
##   1   1   1   1   2   1   1   5   2   1   5   2   3   1   2   3   2
```

```
  1   5   7
##  86  87  88  89  90  91  92  93  94  95  96  97  98  99 100 101 102
103 104 105
##   4   7   5   2   5  10   4  10   5   4  12  13  13  16  17  14  19
 18  18  23
## 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122
123 124 125
##  12  16  15  20  28  16  24  24  30  36  30  35  21  31  31  24  28
 33  28  30
## 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142
143 144 145
##  24  29  28  34  23  25  21  19  18  13  22  15  18  15   9  12  10
 13  17  10
## 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162
163 164 165
##  10   6   4   3   8   3   6   2   5   6   2   1   5   1   5   1   1
  3   1   1
## 166 167 169 170 173 174 176
##   1   1   1   1   1   3   1
```

```
which(table(b) == max(table(b)))
```

```
## 115
##  50
```

```
#####################
b1 <- na.omit(babies) #去除 NA 值
bwt <- b1$bwt

# library(asbio)

### 母體平均數 ###(alternative="two.sided","less","greater")
## 母體變異數已知(常態母體或大樣本)：Z
## 假設母體變異數已知(18.236)，a = 0.05(預設)，雙尾檢定
one.sample.z(bwt, null.mu = 120, sigma = 18.236,
             alternative = "two.sided") #故不拒絕 H0
```

```
##
## One sample z-test
##         z*   P-value
##  -1.009871 0.3125573
```

```
# 區間估計
width <- qnorm(0.975)*(18.236/sqrt(length(bwt))) #qnorm(常態分配機率)
mean(bwt) + c(-width, width)
```

```
## [1] 118.4194 120.5057
```

```r
## 母體變異數未知(常態母體)：t
# t.test(x, mu, alternative, conf.level)
t.test(bwt, mu = 120, alternative = "two.sided")
```

```
##
##  One Sample t-test
##
## data:  bwt
## t = -1.0048, df = 1173, p-value = 0.3152
## alternative hypothesis: true mean is not equal to 120
## 95 percent confidence interval:
##  118.413 120.512
## sample estimates:
## mean of x
##  119.4625
```

```r
t.test(bwt, mu = 120, alternative = "two.sided",
       conf.level = 0.92) #其他信賴水準
```

```
##
##  One Sample t-test
##
## data:  bwt
## t = -1.0048, df = 1173, p-value = 0.3152
## alternative hypothesis: true mean is not equal to 120
## 92 percent confidence interval:
##  118.5252 120.3998
## sample estimates:
## mean of x
##  119.4625
```

```r
####################
### 母體比例p的區間估計
## prop.test(x, n, p, alt, conf)
prop.test(x = 46, n = 150, p = 1/3, alternative = "greater")
```

```
##
##  1-sample proportions test with continuity correction
##
## data:  46 out of 150, null probability 1/3
## X-squared = 0.3675, df = 1, p-value = 0.7278
## alternative hypothesis: true p is greater than 0.3333333
## 95 percent confidence interval:
##  0.2455298 1.0000000
## sample estimates:
##         p
## 0.3066667
```