**HW5**

**## 練習17-1：二項分布中，若在100次試驗中成功20次：**

**## (1)請求出成功機率(假設為p)的95% exact confidence interval。**

p <- seq(0,1,0.01)

times <- 100

sec <- 20

fp <- (-0.975)

for(k in 0:(sec-1)){

fp <- fp+choose(times,k)\*(p^k)\*((1-p)^(times-k))

}

plot(p,fp)

ftn7 <- function(p) {

times <- 100

sec <- 20

fp <- (-0.975)

dfp <- 0

for(k in 0:(sec-1)){

fp <- fp+choose(times,k)\*(p^k)\*((1-p)^(times-k))

dfp <- dfp+choose(times,k)\*((k\*p^(k-1))\*((1-p)^(times-k))-(p^k)\*((times-k)\*(1-p)^(times-1-k)))

}

return(c(fp, dfp))

}

newtonraphson(ftn7, 0.1, 1e-06)

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At iteration 1 value of x is: 0.1982993

At iteration 2 value of x is: 0.1485413

At iteration 3 value of x is: 0.1340764

At iteration 4 value of x is: 0.1279234

At iteration 5 value of x is: 0.1267005

At iteration 6 value of x is: 0.1266556

Algorithm converged

[1] 0.1266556

######

p <- seq(0,1,0.01)

times <- 100

sec <- 20

fp <- (-0.025)

for(k in 0:sec){

fp <- fp+choose(times,k)\*(p^k)\*((1-p)^(times-k))

}

plot(p,fp)

ftn8 <- function(p) {

times <- 100

sec <- 20

fp <- (-0.025)

dfp <- 0

for(k in 0:sec){

fp <- fp+choose(times,k)\*(p^k)\*((1-p)^(times-k))

dfp <- dfp+choose(times,k)\*((k\*p^(k-1))\*((1-p)^(times-k))-(p^k)\*((times-k)\*(1-p)^(times-1-k)))

}

return(c(fp, dfp))

}

newtonraphson(ftn8, 0.2, 1e-06)

newtonraphson(ftn8, 0.2, 1e-06)

At iteration 1 value of x is: 0.2538228

At iteration 2 value of x is: 0.2758288

At iteration 3 value of x is: 0.2877697

At iteration 4 value of x is: 0.2915137

At iteration 5 value of x is: 0.2918404

At iteration 6 value of x is: 0.2918427

Algorithm converged

[1] 0.2918427

**## (2)請以中央極限定理求本題的95% confidence interval，並比較其與(1)小題結果。**

phat <- 20/100

phat-qnorm(0.975)\*sqrt(phat\*(1-phat)/20)

phat+qnorm(0.975)\*sqrt(phat\*(1-phat)/20)

> phat <- 20/100

> phat-qnorm(0.975)\***sqrt**(phat\*(1-phat)/20)

[1] 0.02469549

> phat+qnorm(0.975)\***sqrt**(phat\*(1-phat)/20)

[1] 0.3753045

結果請看第一小題

> binom.confint(20,100)

method x n mean lower upper

1 agresti-coull 20 100 0.2000000 0.1326077 0.2895884

2 asymptotic 20 100 0.2000000 0.1216014 0.2783986

3 bayes 20 100 0.2029703 0.1272666 0.2819852

4 cloglog 20 100 0.2000000 0.1283119 0.2832200

5 exact 20 100 0.2000000 0.1266556 0.2918427

6 logit 20 100 0.2000000 0.1328161 0.2898107

7 probit 20 100 0.2000000 0.1310048 0.2871983

8 profile 20 100 0.2000000 0.1297551 0.2854280

9 lrt 20 100 0.2000000 0.1297488 0.2854267

10 prop.test 20 100 0.2000000 0.1292482 0.2943230

11 wilson 20 100 0.2000000 0.1333669 0.2888292

**## (3)請以中央極限定理求練習17的95% confidence interval，並比較其與95% exact confidence interval，哪一方的結果較為可信？**

phat <- 3/20

phat-qnorm(0.975)\*sqrt(phat\*(1-phat)/20)

phat+qnorm(0.975)\*sqrt(phat\*(1-phat)/20)

> phat <- 3/20

> phat-qnorm(0.975)\***sqrt**(phat\*(1-phat)/20)

[1] -0.006490575

> phat+qnorm(0.975)\***sqrt**(phat\*(1-phat)/20)

[1] 0.3064906

> binom.confint(3,20)

method x n mean lower upper

1 agresti-coull 3 20 0.1500000 0.043939011 0.3688486

2 asymptotic 3 20 0.1500000 -0.006490575 0.3064906

3 bayes 3 20 0.1666667 0.030190567 0.3226836

4 cloglog 3 20 0.1500000 0.037330792 0.3346644

5 exact 3 20 0.1500000 0.032070937 0.3789268

6 logit 3 20 0.1500000 0.049173436 0.3758445

7 probit 3 20 0.1500000 0.043854422 0.3574596

8 profile 3 20 0.1500000 0.039794886 0.3443830

9 lrt 3 20 0.1500000 0.039555944 0.3443762

10 prop.test 3 20 0.1500000 0.039566272 0.3886251

11 wilson 3 20 0.1500000 0.052368746 0.3604189

**exact confidence interval 比較可信**