MA4413 Tutorials for Week 9

Question 10

A survey of study habits wishes to determine whether the meanstudy hours completed by women at a particular college is higher than for men at the same college. A sample of $n_1 = 10$ women and $n_2 = 12$ men were taken, with mean hours of study $\bar{x}_1 = 120$ and $\bar{x}_2 = 105$ respectively. The standard deviations were known to be $\sigma_1 = 28$ and $\sigma_2 = 35$.

The hypothesis being tested is:

$$H_0 : \mu_1 = \mu_2 \qquad (\mu_1 - \mu_2 = 0) \tag{1}$$
$$H_a : \mu_1 \neq \mu_2 \qquad (\mu_1 - \mu_2 \neq 0) \tag{2}$$

In R, the test statistic is calculated using:

```
xbar1 <- 120
xbar2 <- 105
sd1 <- 28
sd2 <- 35
n1 <- 10
n2 <-12
TS <- ( (xbar1 - xbar2) - (0) )/sqrt( (sd1^2/n1) + (sd2^2/n2) )
TS
[1] 1.116536
```

Now need to calculate the critical value or the p-value.

The critical value can be looked up using qnorm. Since this is a one-tailed test and there is a ¿ sign in H_1:

```
qnorm(0.95)
[1] 1.644854
```

Since the test statistic is less than the critical value (1.116536 ¡ 1:645)there is not enough evidence to reject H_0 and conclude that the population mean hours study for women is not higher than the population mean hours study for men.

The p-value is determined using pnorm.

Careful! Remember pnorm gives the probability of getting a value LESS than the value specified. We want the probability of getting a value greater than the test statistic.

```
1-pnorm(1.116536) # OR pnorm(1.116536, lower.tail=FALSE)
[1] 0.1320964
```

Question 8

- A survey, carried out at a major flower and gardening show, was concerned with the association between the intention to return to the show next year and the purchase of goods at this year s show.

- There were 220 people interviewed and of these 101 had made a purchase; 69 of these people said they intended to return next year.
- Of the 119 who had not made a purchase, 68 said they intended to return next year.
- By testing the difference between the proportions of purchasers and non-purchasers who intend to return next year, examine whether there is sufficient evidence to justify concluding that the intention to return depends on whether or not a purchase was made.

H0 : population proportions of those who intend to return are equal

H1 : population proportions of those who intend to return are NOT equal

- Proportion of purchasers 1 : 69 /101;
- proportion of non-purchasers 2 : 68 /119

Observed value of D = 0.1117
Estimated standard error of D = 6.558%