

# Basic Stats

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## Basic Statistics Classwork/Lab

1) In Hong Kong, human male height is approximately normally distributed with mean 171.5 cm and standard deviation 5.5 cm. (Use and show R code to produce answers for a – e) You can use any method for part f.

a) What proportion of the Hong Kong population is between 170 cm and 180 cm?

```
pnorm(180, 171.5, 5.5) - pnorm(170, 171.5, 5.5)
```

```
## [1] 0.5463504
```

b) What proportion of the Hong Kong population is less than 165 cm ?\

```
pnorm(165, 171.5, 5.5)
```

```
## [1] 0.1186389
```

c) What proportion of the Hong Kong population is greater than 175 ?\

```
pnorm(175, mean=171.5, sd=5.5, lower.tail=FALSE)
```

```
## [1] 0.2622697
```

d) The proportion .25 is less than what male height value ?\

```
qnorm(0.25, mean=171.5, sd=5.5)
```

```
## [1] 167.7903
```

e) The proportion .85 is greater than what male height value ?\

```
qnorm(0.85, mean=171.5, sd=5.5)
```

```
## [1] 177.2004
```

f) The proportion of .68 is between what two male height values ?\

```
qnorm(0.68, mean=171.5, sd=5.5)
```

```
## [1] 174.0723
```

```
# 174 and 175 cm
```

2) Use and show R code to determine the height of the standard normal curve at a Z value of 2.5.

```
1 - pnorm(2.5, 0, 1)
```

```
## [1] 0.006209665
```

3) Use and show R code to determine the height of the standard normal curve at a Z value of .4.

```
1 - pnorm(0.4, 0, 1)
```

```
## [1] 0.3445783
```

4) Use and show R code to determine the height of a t distribution curve for a t value of 1.5 with 3 degrees of freedom.

```
1 - pt(1.5, 3)
```

```
## [1] 0.1152919
```

5) Use and show R code to determine the height of a t distribution curve for a t value of -2 with 2 degrees of freedom.

```
1 - pt(-2, 2)
```

```
## [1] 0.9082483
```

6) For a t distribution with 3 degrees of freedom, use and show R code that will find the proportion less than 2.5.

```
pt(2.5, 3)
```

```
## [1] 0.9561467
```

7) For a t distribution with 1 degree of freedom, use and show R code that will find the proportion that is greater than 1.75.

```
pt(1.75, 1)
```

```
## [1] 0.8347507
```

8) For a t distribution with 2 degrees of freedom, use and show R code that will find the value immediately above a proportion of .355.

```
qt(.355, 2)
```

```
## [1] -0.4285376
```

9) An educator believes that new directed reading activities in the classroom will help elementary school pupils improve some aspects of their ability. She arranges for a third -grade class of 23 students to take part in these activities for an eight-week period. A control classroom of 23 third graders follows the same curriculum without the activities. At the end of the eight weeks, all students are given a Degree of Reading Power (DRP) test, which measures the aspects of reading ability that the treatment is designed to improve. The sample data performance results are provided below;

- Treatment Group: 24,61,59,46,43,44,52,43,58,67,62,57,71,49,54,43,53,57,49,56,33,74,70
- Control Group: 42,33,46,37,43,41,10,42,55,19,17,55,26,54,60,28,62,20,53,48,37,85,42
- Design and execute a two sample t test.
  - a) State the appropriate null and alternative hypotheses.

*# Ha: True difference in means between control group and treatment group is 0. New directed reading act*

*# Ho: True difference in means between control group and treatment group is not equal to 0. New directe*

b) Use and show R code to produce the p value and the confidence interval

```
treatment <- c(24,61,59,46,43,44,52,43,58,67,62,57,71,49,54,43,53,57,49,56,33,74,70)
control <- c(42,33,46,37,43,41,10,42,55,19,17,55,26,54,60,28,62,20,53,48,37,85,42)
t.test(treatment, control, var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: treatment and control
## t = 2.6853, df = 44, p-value = 0.01018
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## 2.92872 20.54954
## sample estimates:
## mean of x mean of y
## 53.26087 41.52174
```

*#p-value is 0.01018, 95% confidence interval is [2.92872, 20.54954].*

c) Determine if you should reject or fail to reject the null hypothesis using the p value and the confidence interval.

*# We reject the null hypothesis with a p-value of 0.01018, less than our significance value of 0.05. The confidence interval [2.92872, 20.54954] does not contain 0.*