

Durham University
MATH1541 Statistics
Exercise Sheet 12

Kamil Hepak
Tutorial Group 4

Feb 2019

1 Q1

1.1 a)

$$c = 2.120$$

Under $\sim N$, $c = 1.960$

1.2 b)

$$c = 1.895$$

Under $\sim N$, $c = 1.645$

1.3 c)

$$t_{30}, c = 2.042$$

$$t_{40}, c = 2.021$$

$$t_{35}, c \approx \frac{2.042 + 2.021}{2} = 2.0315 \text{ (Calculator gives 2.0301)}$$

Under $\sim N$, $c = 1.960$

1.4 d)

$$P(T > 1.5) \approx 0.080$$

Under $\sim N$, $P(T > 1.5) \approx 0.067$

1.5 e)

$$P(T > 1.5 \cap T < -1.5) \approx 0.16$$

Under $\sim N$, $P(T > 1.5) \approx 0.134$

2 Q3

2.1 a)

\bar{X} will have an approximately Normal distribution - that is to say, $\bar{X} \sim N(\mu, \frac{\sigma^2}{n})$. Because X has a distribution with mean μ and variance σ^2 , and $n \geq 10$, we can use the Central Limit Theorem to assume \bar{X} 's distribution.

2.2 b)

When the underlying distribution of X is Normal.

2.3 c)

Assuming $\sim N(0, 1)$, since σ is known, $c = 1.960$

2.4 d)

2.4.1 i)

Plot attached.

The normal quantile plot is not very linear - an incredibly "fat pen" would be necessary to encapsulate the data. The use of a t -distribution would probably not be fully appropriate in this scenario.

2.4.2 ii)

t_{12} , $c = 2.179$

2.4.3 iii)

t_{12} , $c = 0.695$