

HW 11.5

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```
library(readxl)
```

- Increasing C increases the margin of error E.
- Increasing σ increases the margin of error E.
- Increasing n decreases the margin of error E.

Problem 1

```
1.645 * (72.50/sqrt(55))
```

```
[1] 16.08135
```

Problem 2

```
1.645 * (72.50/sqrt(85))
```

```
[1] 12.93583
```

The one with sample size n = 85 is lower because the population size(n) and Margin of Error(E) are inversely proportional

Problem 3

```
1.960 * (1.04/sqrt(282))
```

[1] 0.121385

Problem 4

```
1.960 * (1.92/sqrt(282))
```

[1] 0.2240953

E is higher because C and E are directly proportional

Problem 5

```
mileage <- read_excel("mileage.xlsx")
mean(mileage$mpg)
```

[1] 21.71111

```
1.960 * (3.5/sqrt(45))
```

[1] 1.022628

Problem 6

```
2.576 * (3.5/sqrt(45))
```

[1] 1.344026

E is higher because C and E are directly proportional

Problem 7

$$((1.960 * 25)/15)^2$$

[1] 10.67111

n = 11

Problem 8

$$((1.960 * 25)/5)^2$$

[1] 96.04

n = 97

Problem 9

Sample size always increases with larger α . If α increases, the required sample size increases in both problems to maintain the same confidence and margin of error.

Problem 10

SIMILARITIES:

- Both are symmetric (bell-shaped curves)
- As the degrees of freedom increase (or as the sample size n grows large), the t-distribution approaches the standard normal distribution (z-distribution).
- Both are used for calculating confidence intervals.

DIFFERENCES:

- The t-distribution is more spread out than the standard normal.

- The shape of the t-distribution changes with degrees of freedom, while the standard normal is fixed.
- Use the (z-distribution) when σ is known and n is large while.
- Use the t-distribution when σ is unknown or when n is small.