Foundations for statistical inference - Confidence intervals

MATH224 - Intro to Stat

Exercise 1 (5 Points)

1 Point 65% of adults from the sample think climate change affects their community.

```
set.seed(123) # 1 Point

us_adults <- tibble(
  climate_change_affects = c(rep("Yes", 62000), rep("No", 38000))
) # 1 Point

n <- 60
samp <- us_adults %>%
  sample_n(size = n) # 1 Point

samp%>%
  count(climate_change_affects) %>%
  mutate(p = n /sum(n)) # 1 Point
```

```
## # A tibble: 2 x 3
##   climate_change_affects     n     p
##   <chr>                  <int> <dbl>
## 1 No                        21  0.35
## 2 Yes                       39  0.65
```

Exercise 2 (3 Points)

We wouldn't expect another students sample proportion to be the same as mine. It will be identical given that there was a lot of rounding or if two students had the same seed. We would expect it to be similar most of the time. But sometimes it could be further away.

Exercise 3 (3 Points)

95% confidence means that 95% of the time, the true proportion will be contained within the confidence interval for any given sample of the same size.

OR

A 95% confidence interval means that if we were to take 100 different samples and compute a 95% confidence interval for each sample, then approximately 95 of the 100 confidence intervals will contain the true proportion (p).

Exercise 4 (3 Points)

1 Point The true proportion is 0.62. So our confidence interval captures the true proportion.

```
prop_test(samp,
          climate_change_affects ~ NULL,
          success = "Yes",
          z = TRUE,
          conf_int = TRUE,
          conf_level = 0.95, correct = FALSE) # 2 Points
```

```
## # A tibble: 1 x 5
##   statistic p_value alternative lower_ci upper_ci
##       <dbl>   <dbl> <chr>          <dbl>    <dbl>
## 1      2.32  0.0201 two.sided      0.524    0.758
```

Exercise 5 (3 Points)

We would expect 95% of the students to have captured the true proportion in their confidence intervals on average. This is because every student used a confidence level of 0.95 (95%)

Exercise 6 (3 Points)

Use this link

In my run, only 94% (47 out of 50) of the confidence intervals captured the true proportion. This is not exactly equal to the confidence level of 95%. This is because of the fact that we used 50 confidence intervals which can't be split in any way to get a proportion of 95%. It's going to be either 94% or 96% on average which would mean it rounds up to 95% on average.