Ch8 Final Project - Is Light Better

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Step 1

I calculated the % daily value of sugar and calories for 15 popular cereals at the supermarket. Then, I normalized all of the values to a serving size of 0.75 cups.

```
Cereal Name            Serving Size Calories %DV Total Carbohydrates
Standard Toasty Flakes 0.75 cups    180      10%
Cheerios               0.75 cups    75       5.25%
Cinnamon Toast Crunch  0.75 cups    130      8%
Life                   0.75 cups    120      8%
Honey Nut Cheerios     0.75 cups    110      7%
Lucky Charms           0.75 cups    110      7%
Frosted Flakes         0.75 cups    110      9%
Special K              0.75 cups    120      6%
Fruit Loops            0.75 cups    82.5     9%
Fruity Pebbles         0.75 cups    120      8%
Cocoa Pebbles          0.75 cups    119      8%
Raisin Bran            0.75 cups    139      11.25%
Corn Flakes            0.75 cups    75       6%
Golden Grahams         0.75 cups    120      9%
Rice Krispies          0.75 cups    100      8.6%
```

Step 2

Part 1 - State

I need to calculate a 99% confidence interval for the mean %DV of carbohydrates from a sample of 15 cereals. In other words, I need to define an interval such that 99% of samples of size 15 will have a mean within the interval. It is safe to assume that the random condition is met (there are more than 150 cereals). However, the large sample condition is not met, as I am only sampling 15 cereals (15<30), however the data seems relatively normal, thus I can apply the following formula.

Part 2 - Plan

I will use the formula x +- t*s/sqrt(n) where x is the sample mean, s is the sample sd, t is the critical value, and n is the sample size, so 15. I will calculate t using the invT function on my calculator, with a 0.99 center area and a degree of freedom of 14 (n-1).

Part 3 - Do

```
[1] "Sample mean is: 8.00666666666667"
```

Code

```
[1] "Sample standard deviation is: 1.59204121746117"
```

Code

```
[1] "Critical value is: 2.977"
```

Code

```
[1] "Square root of n is: 3.873"
```

Therefore, my margin of error is:

2.977 * 1.592/3.873 = 1.224

and my confidence interval is:

8.007 +- 1.22 = 6.783% to 9.231% of daily carbohydrates

Part 4 - Conclude

From this confidence interval, it seems logical to consider a carbohydrate %DV of 5 as light. A value of 5% is over an entire margin of error away from the lower bound of the 99% confidence interval. In other words, 99% of samples of 15 cereals will have a mean carbohydrate content that is at least 1.2% higher than Toast Flakes Light. Therefore, in terms of sugar content, Toast Flakes Light can be considered a light cereal.

Step 3

Part 1 - State

I need to calculate a 99% confidence interval for the mean calories from a sample of 15 cereals. In other words, I need to define an interval such that 99% of samples of size 15 will have a mean calories within the interval. Like in Step 2, I'll assume that the random condition is met (there are more than 15*10 cereals). However, the large sample condition is not met, as I am only sampling 15 cereals (15<30), however the data seems relatively normal, thus I can apply the following formula.

Part 2 - Plan

I will use the formula x +- t*s/sqrt(n) where x is the sample mean, s is the sample sd, t is the critical value, and n is the sample size, so 15. I will calculate t using the invT function on my calculator, with a 0.99 center area and a degree of freedom of 14 (n-1).

Part 3 - Do

Code

```
[1] "Sample mean is: 114.033333333333"
```

<div style="text-align: right;">Code</div>

```
[1] "Sample standard deviation is: 26.3007785508519"
```

<div style="text-align: right;">Code</div>

```
[1] "Critical value is: 2.977"
```

<div style="text-align: right;">Code</div>

```
[1] "Square root of n is: 3.873"
```

Therefore, my margin of error is:

2.977 * 26.301/3.873 = 20.216

and my confidence interval is:

114.033 +- 20.216 = 93.817 calories to 134.249 calories

Part 4 - Conclude

From this confidence interval, I would not consider Toasty Flakes Light to be a light cereal, as 130 calories is well within the 99% confidence interval, and is in fact greater than the sample average of 114 calories. In other words, 99% of samples of 15 cereals will have a mean calorie content that is less than Toast Flakes Light.

Conclusion

While I would say that Toasty Flakes Light has a low sugar content, I would not consider it to be a light cereal, due to it's high calories. Yes, Toasty Flakes Light was below the lower bound of the 99% confidence interval for mean %daily carbohydrates, however it fell well in the upper half of the 99% confidence interval for mean calories. Thus, while it may be healthier than most other cereals, it has too many calories when compared to other cereals to be considered light. If I were to redo this project, I would probably want to more precisely define what makes a cereal "light".