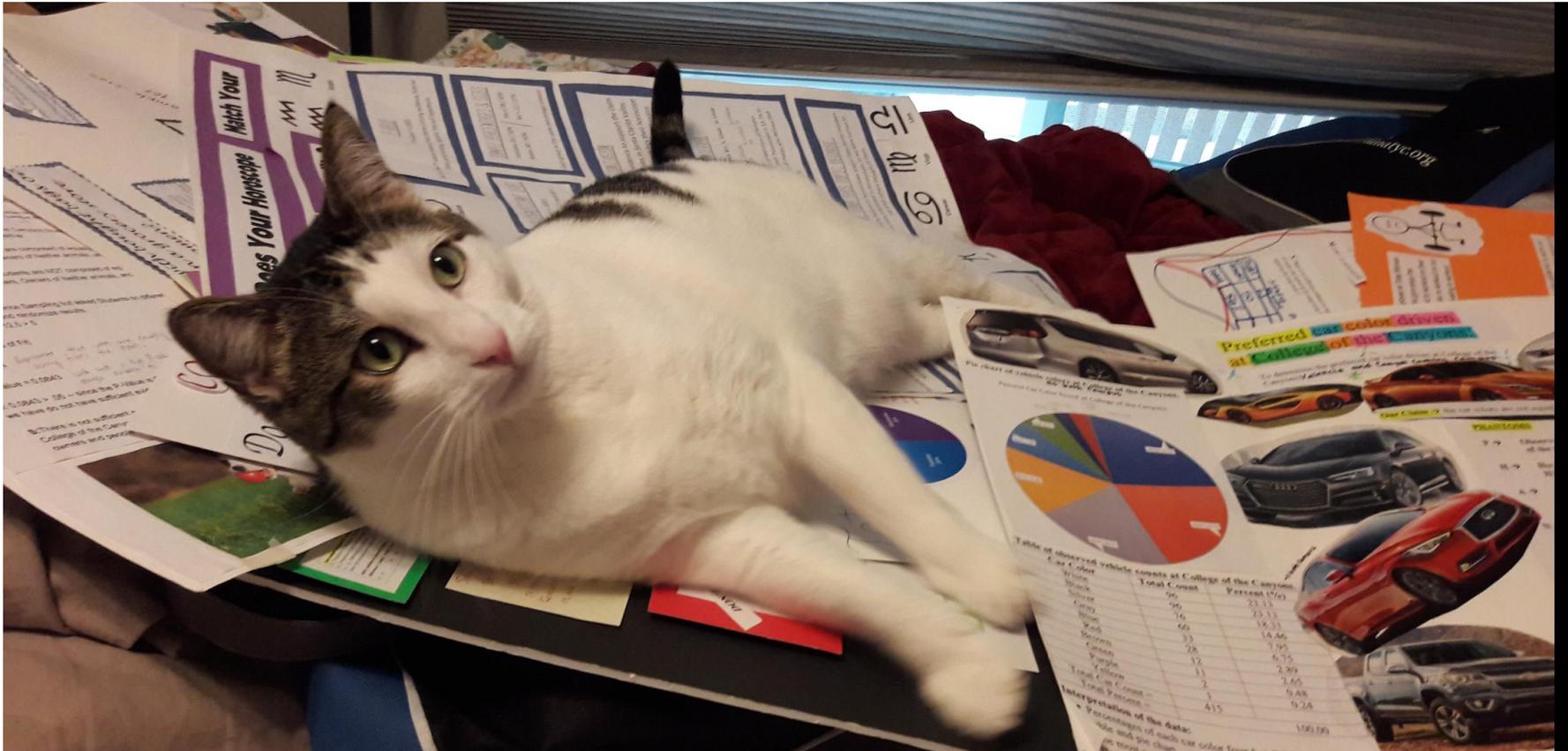


Professor Silva's Cat loves to help grade:



Here are some examples. These are meant to help guide you, but there are mistakes on all of these! And some of our requirements have changed over the years, so be sure to check the rubric for what's needed on your poster!

Preferred car color driven at College of the Canyons.

To determine the preferred car color driven at College of the Canyons Valencia and Canyon Country campus.

Our Claim → the car colors are not equally distributed.

Why did we pick this topic?
For our project, we decided to count colored cars because we love cars! It is an integral part of our lives, taking us from point A to point B. The car represents freedom, being able to go where we want and whenever we want.

PHANTOMS

P → Observed and expected counts of car color at College of the Canyons.

H → H₀: the car colors are all equally distributed.
H₁: the car colors are not equally distributed.

A → Random stated
Expected values: $415/10 = 41.5 > 5$
Assumptions are met

N → X^2 GOF

T → X^2 : 306.71084

O → P-value: <0.0001

M → $-0.0001 < 0.05$ reject the H₀

S → We have sufficient evidence to support that the car colors at both College of the Canyons Valencia and Canyon Country campus are not equally distributed.

The chi-square test statistic X^2 measures how far the observed data are from the null hypothesis by comparing observed counts and expected counts.

$X^2 = 306.71084$
We have determined our Chi-square test statistic value to be 307. With such a large Chi-square value, it reveals our null hypothesis is false.

NOTE!!!
We have selected White car color as the largest sample percent, and Green car color to be the smallest sample percent in order to meet our assumptions for a 2-population proportion.

PANIC

P1: the true proportion of all colored car at College of the Canyons is white.
P2: the true proportion of all colored car at College of the Canyons is green.

P →

A → Random stated
White: $96 > 10$ # of success
White: $319 > 10$ # of failure
Green: $11 > 10$ # of success
Green: $404 > 10$ # of failures
All assumptions met

N → 2 prop Z Int

I → (0.17, 0.24)

C → We are 90% confident that the true white colored cars at College of the by 17% to 24% than green colored not in our interval, this suggest difference.

Table of observed vehicle counts at College of the Canyons.

Car Color	Total Count	Percent (%)
White	96	23.13
Black	96	23.13
Silver	76	18.31
Gray	60	14.46
Red	33	7.95
Brown	28	6.75
Green	12	2.89
Purple	11	2.65
Yellow	2	0.48
Total Car Count =	415	100.00

Interpretation of the data:
Percentages of each car color found at COC is shown on the table and pie chart.
The most popular car color is tied between Black and White.
The least used car color is Yellow.

collecting Methods:

Observation: college of the canyons parking lot
Choose a random day of the week and time to observe vehicles in the parking lot.
Observed a total of 415 vehicles.

Sampling: geographically dividing the population into
Valencia Campus
Canyon Country Campus

Conclusion
We have sufficient evidence to support that the car color at both College of the Canyons Valencia and Canyon Country campus are not equally distributed.

Significance level = 5%
 $0.0001 < 0.05$ reject the null!

ANOVA:

COMMERCIALS COMMANDING YOUR TIME

I hoped to discover whether the average commercial break was longer or shorter depending on what type of program you were watching.

$H_0: \mu_s = \mu_n = \mu_k = \mu_m$ / (There is no difference between the programs)
 H_1 : at least one of the μ is different

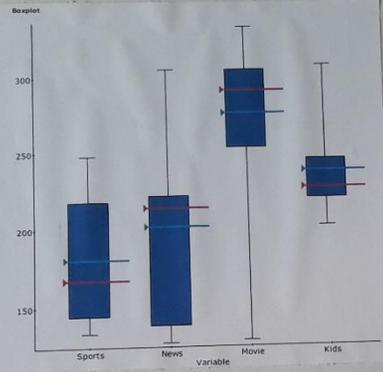
Data Collection Method

Convenience Sample of 15 commercial breaks per / program type

- Time each commercial with a stop watch from start to end
- 15 sports breaks, 15 news breaks, 15 kids breaks, 15 movie breaks

Assumptions Check

- Random Sample
- Independent Groups
- All Samples >30
- 15<30
- 15<30
- 15<30
- 15<30
- Standard Deviation of greatest/lowest < 2
- Movies/Kids = 57.6/30.4 = 1.895



- Program 1: Sports (Basketball, Baseball, Hockey)
- Program 2: News (CNN, Fox News, KTLA)
- Program 3: Kids (Disney, Nickelodeon, Cartoon Network)
- Program 4: Movies (FXM, Spike, AMC)

F - Statistic = 13.01

The sample means are largely different and there is little to no overlap among the different programs. This leads to the distribution having a large F-Stat. A large F-Stat typically means that the distribution data is not in support of the Null Hypothesis. The Stat is statistically significant because it is > .05.

P - Value = < .0001

<.0001 < .05, So Reject the Null Hypothesis
 If the Null Hypothesis is true, then there is less than a .01 % chance of getting the sample data or more extreme.
 (Not likely to be affected by random chance, you can assume this because the p-value is so low)

Conclusion

There is sufficient evidence to support the claim that at least one of the TV programs has a different average commercial break length than the others.

Movies vs Sports Confidence Interval

We are 90% confident that the true mean length of a commercial break during a Movie program is between 68.5 seconds and 124.2 seconds longer than the true mean length of a commercial break during a Sports program.

- The mean commercial break during a movie is longer than that of a sports program
- The mean commercial break during a movie could be anywhere from 68 to 124 seconds longer than that of a sports program

Analysis of Variance results:
 Data stored in separate columns.

Column	n	Mean	Std. Dev.	Std. Error
Sports	15	180.46667	40.403088	10.432032
News	15	201.73333	57.607622	14.874224
Movie	15	276.8	48.922972	12.631857
Kids	15	238.26667	30.473564	7.8682404

ANOVA table

Source	DF	SS	MS	F-Stat	P-value
Columns	3	80728.983	26909.661	13.010611	<0.0001
Error	56	115824	2068.2857		
Total	59	196552.98			

Two sample T hypothesis test:

- μ_1 : Mean of Movie
- μ_2 : Mean of Sports
- $\mu_1 - \mu_2$: Difference between two means
- $H_0: \mu_1 - \mu_2 = 0$
- $H_A: \mu_1 - \mu_2 > 0$
 (with pooled variances)

Difference	Sample Diff.	Std. Err.	DF	T-Stat	P-value
$\mu_1 - \mu_2$	96.333333	16.382647	28	5.8802058	<0.0001

Two sample T confidence interval:
 μ_1 : Mean of Movie
 μ_2 : Mean of Sports
 $\mu_1 - \mu_2$: Difference between two means
 (with pooled variances)

Difference	Sample Diff.	Std. Err.	DF	L. Limit	U. Limit
$\mu_1 - \mu_2$	96.333333	16.382647	28	68.464306	124.20236

Why Commercials

I chose to do my project on commercial length because I saw the suggestion online and it interested me. I also often found myself watching TV whilst complaining about commercial time. So, I figured, why not analyze it.

2 proportion:

Do Women prefer to work out on their own or prefer to take classes?

tw

Population 1: Women at Total Woman Gym who workout on their own
Population 2: Women at Total Woman Gym who take exercise classes

Null Hypothesis (H_0): There is no difference between preferences between women who take exercise classes at Total Woman Gym.
 $H_0: p_1 = p_2$

Alternative Hypothesis (H_a): There is a difference between women who prefer to take classes rather than working out on their own at Total Woman Gym.
 $H_a: p_1 \neq p_2$

Data Collection Methods:
 Population of women who check into Total Woman Gym & Day Spa during the hours that exercise classes are offered. Data was collected by observing and counting the women that checked in and counted the ones that went into a class or worked out on their own. Data was random because data was taken from everyday for two weeks. For those two weeks data was collected by observing different times of the day when exercise classes were being offered.

Assumptions:
 Random Stated ✓
 Worked out: # of successes $1057 \geq 10$ ✓
 Taken classes: # of failures $959 \geq 10$ ✓
 Independence: # of successes $959 \geq 10$ ✓
 Independence: # of failures $1057 \geq 10$ ✓

Test Statistic:
 $Z = 0.637$
 The sample percent of people who preferred to work out on their own is 0.637 standard errors above the percent of those who prefer to take classes.

P-Value = 0.5242
 If the H_0 is true, there is a 52.42% chance of getting the sample data or more extreme. Because the P-value is high, it is likely to happen by random.

P-value = 0.5242 > 0.05 Fail to reject H_0

Are we Confident?
 We are 90% confident that the true proportion of women who prefer to work out on their own is between 0.4745 and 0.745. There is no significant difference between both populations because the difference of .049.

Conclusion:
 There is not sufficient evidence to support the claim that the true proportion of women who prefer to take exercise classes is not equal to the proportion of women who prefer to work out on their own.

Exercising by self	Taking Classes	Total
1057	959	2016
52.4%	47.6%	100%

52.4% (Exercising by self)
47.6% (Taking Classes)

Victoria Conneil #

MORAL DILEMMA

For my project, I asked two groups of high schoolers two different moral dilemma questions.

The first dilemma was the Trolley Problem.

The trolley problem is to thought experiment in ethics. The general form of the problem is this: There is a runaway trolley heading down the railway tracks. The trolley on the tracks, there are five people tied up and unable to move. The trolley is headed straight for them. You are standing some distance off to the side with a lever that can be flipped. If you pull this lever, the trolley will switch to a different set of tracks. However, you notice that there is also person on the side track. You have two options:

1. Do nothing, and the trolley runs over the five people on the main track.
2. Pull the lever, diverting the trolley onto the side track where it will run over one person.



Population 1: SCV High School Students that are chosen the "switch tracks" moral dilemma

p1: Percentage of SCV High School Students that would switch the tracks to save 4 people but allowing 1 person to die.

Population 2: SCV High School Students that are chosen the "bridge push" moral dilemma

p2: Percentage of SCV High School Students that would push someone off the bridge in order to save 4 other people.

How was the data collected? (Random Clusters)

North Clackamas Valley International high school (NCVI) divides all high school students into randomly selected groups (clusters). Each group has students from all grades and corridors with a homeroom class.

To collect the data, I used a random cluster technique. I randomly selected 2 homeroom classes to receive the SWITCH TRACKS moral dilemma problem and collected data from everyone in those classes. I also randomly selected 2 other homeroom classes to receive the BRIDGE PUSH moral dilemma problem and collected data from everyone in those classes. Everyone in the high school had a chance to be in my data, so it was random. The people that received the switch track question were not the same as the people that received the bridge push question.

Data and Graphical Display (Pie Charts)

Switch Tracks Data: 42 total, 36 said they would switch the tracks, 6 said they would not/bridge push. **Bridge Push Data:** 44 total, 3 said they would not push, 41 said they would not push.

Dot Chart

Sample Percentage Comparison

p-hat1: Sample Percentage of SCV High School Students that would switch the tracks to save 4 people but allowing 1 person to be sacrificed.

p-hat2: Sample Percentage of SCV High School Students that would push someone off the bridge in order to save 4 other people.

$p-hat1 = 36/42 = 0.857$ or 85.7%

$p-hat2 = 3/44 = 0.068$ or 6.8%

The "switch tracks" sample percentage (p-hat 1) is higher than the "bridge push" sample percentage (p-hat 2). In fact it is 0.789 (78.9%) higher.

Total Sample Sizes and Number of Successes for each group

Sample 1 (Switch Tracks data): Total Sample Size $n1 = 42$, Number of Success $x1 = 36$

Sample 2 (Bridge Push data): Total Sample Size $n2 = 44$, Number of Success $x2 = 3$

The second was the Bridge Problem

A trolley is heading down a track towards five people. You are on a bridge over which it will pass, and you can stop it by putting something in front of it. In its path lies a large brick and a large stone. You only have time to get one. You have two options:

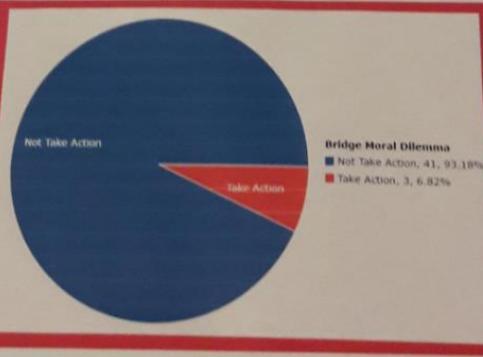
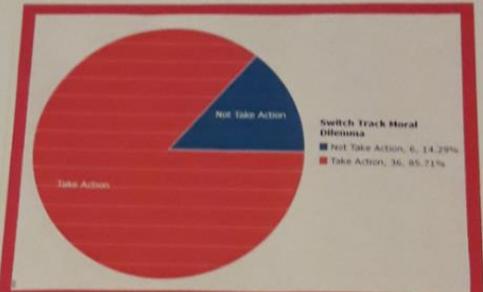
1. Do nothing, and the trolley runs over the five people on the main track.
2. Push the brick off the bridge, killing him but saving the five.



Reject or fail to reject the null hypothesis?
Since our P-value (0%) is less than our significance level of 5%, we should reject the null hypothesis.

P-value = 0%

Reject Ho



Z-score Test Statistic and Sentence (from StatCrunch)

$Z = +7.346$

Sentence: The sample percentage from the switch track data was 7.346 standard errors above the sample percentage from the bridge push data.

[Explanation: This is a very large Z-score since it is significantly more than 2 standard errors. There seems to be a big difference between the two groups]

Hypothesis Test Conclusion (low P-value, claim is Ho)

There is significant evidence to support my claim that the percentage of all SCV high school students that would intervene in the switch tracks dilemma is higher than the percentage of all SCV high school students who would intervene in the bridge dilemma.

90% Confidence Interval (From StatCrunch)

$(0.680, 0.898)$ or $(66.0\%, 89\%)$

We are 90% confident that the percentage high school students that would intervene in the switch tracks dilemma is between 66.0% and 89%.

How was this data collected or summarized by you?

I am interested in the percentages of moral dilemmas and what they say about human nature. Their questions were the same, but the questions were different to ask the other people, and get the clearly organized by themselves and they answer to them. After asking these questions, I also asked the alternative and they answered that they thought they could argue that in both dilemmas, someone would be killed anyway, and being a utilitarian in these dilemmas, someone would argue that for not killing anyone, you are choosing not to intervene in something that is already happening, and therefore, you are choosing not to intervene in the moral dilemma because for those that would have died for the trolley problem, you are trying to question the fact to save the every

utilitarian in pushing someone off a bridge to saving others through a majority of people will agree of putting the weight to save the ones. The ones to attempt to find a concrete moral dilemma between the two groups. The first dilemma is that in the first case, one dies and several others survive because the trolley is not in a safe orbit of pushing the trolley away from the track to saving the one in a safe orbit of pushing the trolley away from the track to the trolley in the second case, forcing the one to an integral part of the plan to save the five. The moral dilemma between I calculated from those that chose not to intervene in the bridge dilemma such that by pushing someone off a bridge, you are actively harming someone. Therefore, the act of putting a lever between you and discontinue you from the situation.

Checking Assumptions Did not meet all the assumptions, so will not apply to the population

Switch Tracks Data

1. Random? Yes. Random cluster data
2. At least 10 success? Yes. 36 people would switch the tracks.
3. At least 10 failures? No. Only 6 said they would not switch the tracks.
4. Independent Samples? Yes. These were different randomly selected groups. They were not matched pairs.

Bridge Push Data

1. Random? Yes. Random cluster data
2. At least 10 success? No. Only 3 people would push a person off the bridge.
3. At least 10 failures? Yes. 41 said they would not push a person off the bridge.
4. Independent Samples? Yes. These were different randomly selected groups. They were not matched pairs.

Claim, Null and Alternative Hypothesis

p1: Percentage of all SCV High School Students that would switch the tracks to save 4 people but allowing 1 person to be sacrificed.

p2: Percentage of all SCV High School Students that would push someone off the bridge in order to save 4 other people.

Population Claim: I claim that the percentage of SCV high school students that would switch the tracks is higher than the percentage of SCV high school students that would push a person off of the bridge.

$H_0: p1 = p2$

$H_a: p1 > p2$ (claim)

This is a "Right tailed" hypothesis test

P-Value and Sentence (StatCrunch)

P-Value = 0 (-0.0001)

Sentence: If the null hypothesis is true and the population percentages for the two different moral dilemmas is the same, then there was about 0 probability of getting this sample data difference or more extreme by random chance.

[Explanation: This is a very significant P-value as it is very close to zero. This means my sample percentages were very significantly different.]

Random Chance: If the populations are equal there is close to zero probability of this data happening by random chance. It is very unlikely to happen because of sampling variability. The only alternative is that the null hypothesis is wrong and populations are different.]