



## Going Nuts – Inference Review Problem Set



**Instructions:** For each problem, name the problem type and write hypotheses (if appropriate).

**Work out the problem completely IF:**

- you are asked to find the necessary sample size
- OR
- the problem is a chi-squared problem

**Please show all solutions on separate paper.**

The following data will be needed for some of the problems:

<b>Type of nut</b>						
	<b>pecans</b>	<b>hazelnuts</b>	<b>brazil nuts</b>	<b>almonds</b>	<b>cashews</b>	<b>peanuts</b>
<b>Planters</b>	7	14	7	58	39	265
<b>Store brand</b>	6	34	7	31	41	144

1. Peanuts are the cheapest nuts to include in a mixed nuts package. But many people prefer one of the other kinds of nuts. To entice buyers to purchase the Planters brand, the package boasts “less than 50% peanuts.” Does your sample provide evidence that packages of Planters nuts contain less than 50% peanuts?
2. Estimate the proportion of peanuts contained in a Planters mixed nuts package. Complete the appropriate confidence interval. Comment on the relationship between your interval and the test you used in problem 1.
3. A generic brand of mixed nuts sets its loading machine to include the following proportion of nuts by count into each of its containers. Of course, since nut size varies the machine does not include exactly the same proportions in each container. Does your distribution of nuts meet the company specifications? The company standards are listed in the table below.

<b>Generic Brand Mix - Type of nut</b>						
	<b>pecans</b>	<b>hazelnuts</b>	<b>brazil nuts</b>	<b>almonds</b>	<b>cashews</b>	<b>peanuts</b>
<b>proportion</b>	4%	12%	4%	15%	15%	50%

4. According to the Planters website, the claim of “less than 50% peanuts” is determined by weight rather than count. A random selection of 10 packages of mixed nuts was pulled from the production line and the peanuts in each container were weighed in grams. In order to meet the advertised claim, a package labeled 326 grams must contain less than 163 grams of peanuts. Does this sample provide evidence for the claim that, on average, less than 163 grams of the nuts are peanuts?

<u>Sample peanut weights</u>				
142.9	176.9	166.5	166.9	157.2
154.9	139.3	163.5	147.0	152.8

5. Construct a confidence interval for the data in problem 4.
6. Does it really matter whether or not you buy the Planters nuts or the store brand nuts? In other words, is the relative distribution of nut types the same for each of the two brands?
7. A cashew farmer is interested in knowing which brand contains the highest proportion of cashews. He plans to sell his cashews to the company that favors them in its product to ensure larger sales. How large a sample of each brand of nuts must he get to be 95% confident his proportion is within 2% of the true proportion of cashews used by the company.
8. Our cashew farmer just realized his nuts will be bought by weight. How many containers of mixed nuts must he include in a sample to be 95% confident his interval will be within 3 grams of the true mean weight of cashews in each container? A small preliminary study gave a standard deviation of 10 grams.
9. An almond lover wants to know if the proportion of almonds in the generic brand is different than the proportion of almonds in the Planters brand of mixed nuts. Assume the nuts in each container are randomly selected from the production line and complete the appropriate test.
10. Construct the confidence interval for the difference in the proportion of almonds in the two brands.
11. A regional grocery chain develops its own variety of mixed nuts to compete with the Planters brand. Planters randomly selects 8 weeks from the first 40 weeks since the introduction of the new product to determine if the competition is hurting its brand name sales. The data are listed in the table below. Complete the appropriate test to determine if a linear regression equation is useful in predicting future sales. Also comment on the sales trend by interpreting the slope of the equation.

	Planters Sales since introduction of store brand							
Weeks since introduction	1	7	10	14	20	21	26	30
Number sold	425	423	422	423	421	421	420	418

12. A generic brand of mixed nuts launches an advertising campaign claiming their brand has more pecans by weight than the name brand product. A committee for truth in advertising randomly selects 35 containers of the name brand product and 40 containers of the generic brand of the same size. The pecans are weighed from each container with the results listed below. Will the results of the study support the generic brand's advertising claim?

<u>Name Brand</u>		<u>Generic Brand</u>	
mean weight	10.1 grams	mean weight	14.2 grams
st. dev	5 grams	st. dev	4 grams