Mixed Inference Review #2

For each problem state: the **type** of problem, the **hypotheses** if appropriate, and the **formula** needed.
For #1, 2, 4, 5, 7, and 12, **fill in the values** for the formula. **Please write all solutions on separate paper**.

1) The *Wall Street Journal* reported that Coca-Cola sells about 47% of all soda pop consumed worldwide. Suppose your observation of a random sample of 216 students who selected a soft drink from school vending machines showed that 81 chose a Coke product. Does this indicate that the soft drink market share of Coca-Cola at the school is different from 47%?

2) Two different treatments for headaches (relaxation therapy and cognitive-behavioral therapy) were compared. A random sample of 24 headache sufferers was treated using relaxation therapy. They had a mean of 3.82 headache-free days with a standard deviation of 1.75 days. Another random sample of 24 headache sufferers were treated using cognitive-behavioral therapy resulting in a mean of 5.71 headache-free days with a standard deviation of 1.43 days. What is a 90% confidence interval for the difference in mean headache-free days for the cognitive-behavioral therapy group and the mean headache-free days for the relaxation therapy group?

3) In a study of memory recall, eight people were given 10 minutes to memorize a list of 20 nonsense words. Each was asked to list as many words as he or she could remember both one hour and 24 hours later. Is there evidence to suggest that the mean number of words recalled after one hour exceeds the mean number of words recalled after 24 hours by more than _three_ words?

1 hr later	14	12	18	7	11	9	16	15
24 hr later	10	4	14	6	9	6	12	12

4) *USA Today* (1992) reported that 39% of all elementary school children claimed that when they grow up they want to do something to help other people. However, in 1995, 128 of a random sample of 317 of these same children claimed that when they grow they want to do something to help other people. Does this information indicate that there has been an attitude change either way?

5) Sixty-five clerical workers at a large financial service organization participated in a health risk analysis. The sample mean systolic blood pressure and standard deviation were 111.63 and 11.94, respectively. Is there sufficient evidence to conclude that the mean systolic pressure for all clerical workers at this business exceeds 110?

6) The following data is the age at death (in days) for infants who died from sudden infant death syndrome (SIDS). Construct a 95% confidence interval for the true difference in mean age at death for male and female SIDS victims.

Female	55	120	135	154	54	115
Male	56	60	60	106	140	147

7) Based on information from *Harper's Index*, 37 out of a random sample of 100 adult Americans who did not attend college believe in extraterrestrials. However, out of a random sample of 100 adult Americans who did attend college, 47 claim that they believe in extraterrestrials. Does this indicate that the proportion of adult Americans who attended college who believe in extraterrestrials is higher than the proportion of adult Americans who did not attend college?

8) The times of first sprinkler activation (in seconds) for a series of tests of fire-prevention sprinkler systems that use aqueous film-forming foam is as follows. The system has been designed so that the true average activation time is supposed to be at most 25 seconds. Do the data indicate the design specifications have not been met?

| 27 | 41 | 22 | 27 | 23 | 35 | 33 | 24 | 28 | 22 | 24 | 30 |

9. Nine observations of surface-soil pH were made at each of two different locations at the Central Soil Salinity Research Institute experimental farm, and the resulting data appeared in the article "Sodium-Calcium Exchange Equilibria in Soils as Affected by Calcium Carbonate and Organic Matter" (*Soil Sci.* (1984): 109). Do the accompanying data suggest that the true mean soil pH values differ for the two locations? Test the appropriate hypotheses using a .05 significance level.

Site	pH				
Location A	8.53	8.52	8.01	7.99	7.93
	7.89	7.85	7.82	7.80	

Location B	7.85	7.73	7.85	7.40	7.35
	7.30	7.27	7.27	7.23	

10. Samples of both surface soil and subsoil were taken from eight randomly selected agricultural locations in a particular county. The soil samples were analyzed to determine both surface pH and subsoil pH, with the results shown in the accompanying table.

	Location							
	1	2	3	4	5	6	7	8
Surface pH	6.55	5.98	5.59	6.17	5.92	6.18	6.43	5.68
Subsoil pH	6.78	6.14	5.80	5.91	6.10	6.01	6.18	5.88

Compute a 90% confidence interval for the true average difference between surface and subsoil pH for agricultural land in this county.

11. The article "Agronomic Performance of Winter Versus Spring Wheat" (*Agronomy J.* (1991): 527-531) described the results of an experiment to compare the yield (kg/ha) of Sundance winter wheat and Manitou spring wheat. Data for nine test plots is given in the accompanying table. Is there sufficient evidence to conclude that the mean yield for the Sundance winter wheat is higher than that for the Manitou spring wheat? Use $\alpha = .01$.

	1	2	3	4	5	6	7	8	9
Sundance	3201	3095	3297	3644	3604	2860	3470	2042	3689
Manitou	2386	2011	2616	3094	3069	2074	2308	1525	2779

12. Marine farms must closely monitor temperatures of fishponds since temperature change could result in the death of fish and a large financial loss. To monitor the temperature of a particular pond, 35 readings are taken at the eastern end, and the mean and standard deviation are 72.6 and 0.8 degrees, respectively. For 38 readings at the western end, the mean and standard deviation are 71.9 and 0.4 degrees, respectively. Estimate with 99% confidence the true difference in the mean temperature at the two sites.