MTH 372 (2025): Tutorial VIII

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1. Researchers are interested in the mean age of a certain population. A random sample of 10 individuals drawn from the population of interest has a mean of 27. Assuming that the population is approximately normally distributed with variance 20, can we conclude that the mean is different from 30 years. Use $\alpha = 0.05$.

2. A researcher reports that the average salary of assistant professors is more than $\$42,000$. A sample of 30 assistant professors has a mean salary of $\$43,260$. At $\alpha = 0.05$, test the claim that assistant professors earn more than $\$42,000$ per year. The standard deviation of the population is \$5230.

3. A medical investigation claims that the average number of infections per week at a hospital in southwestern Pennsylvania is 16.3. A random sample of 10 weeks had a mean number of 17.7 infections. The sample standard deviation is 1.8. Is there enough evidence to reject the investigator's claim at $\alpha = 0.05$.

4. A physician claims that joggers' maximal volume oxygen uptake is greater than the average of all adults. A sample of 15 joggers has a mean of 40.6 milliliters per kilogram (ml/kg) and a standard deviation of 6 ml/kg. If the average of all adults is 36.7 ml/kg, is there enough evidence to support the physician's claim at $\alpha = 0.10$.

5. A study is done by a community group in two neighboring colleges to determine which one graduates students with more math classes. College A samples 11 graduates. Their average is 4 math classes with a standard deviation of 1.5 math classes. College B samples 9 graduates. Their average is 3.5 math classes with a standard deviation of 1 math class. The community group believes that a student who graduates from college A has taken more math classes, on the average. Both populations have a normal distribution. Test at a 1% significance level.

6. The mean lasting time of 2 competing floor waxes is to be compared. Twenty floors are randomly assigned to test each wax. Both populations have a normal distribution. The following table is the result.

Wax	Sample Mean Number of Months Floor Wax Last	Population Standard Deviation
1	3	0.33
2	2.9	0.36

Does the data indicate that wax 1 is more effective than wax 2. Test at a 5% level of significance.

7. A study was conducted to investigate the effectiveness of hypnotism in reducing pain. Results for randomly selected subjects are shown in the table. The "before" value is matched to an "after" value and the differences are calculated. The differences have a normal distribution.

Subject	A	B	C	D	E	F	G	H
Before	6.6	6.5	9.0	10.3	11.3	8.1	6.3	11.6
After	6.8	2.4	7.4	8.5	8.1	6.1	3.4	2.0

Are the sensory measurements, on average, lower after hypnotism. Test at a 5% significance level.