Chapter 14

30. In order to plan its next advertising campaign, the Trendy Motor Vehicle Company is investigating whether the type of vehicle and the color of vehicle are related. Each person in a random sample of size 275 selected from the company's mailing list was classified according to the type (car or truck) and the color of vehicle he or she drove. The data are shown in the table below.

		Vehicle Color				
		Red	Black	White	Tan	Green
Vehicle Type	Car	35	23	41	21	12
	Truck	27	55	39	12	10

Which of the following procedures would be most appropriate to use for investigating whether there is a relationship between vehicle type and color?

(A) A two-sample t-test

(B) A two-sample z-test

(C) A matched pairs t-test

(D) A chi-square goodness-of-fit test

(E) A chi-square test of independence ← two variables that are categorical like vehicle color and vehicle type

Chapter 13 Review

A randomized experiment involving two types of tomato fertilizers were used to see which one yielded a greater number of tomatoes. The chart below shows the results of this experiment:

	Fertilizer A	Fertilizer B
Average Number of Tomatoes in each plant	19.44	24.21
Standard Deviation of the samples	3.54	4.89
Number of plants	17	18

Note: The distribution of the data did not show marked skewness and there were no outliers in either data set.

Q: What are the Null and Alternative Hypothesis? State all your parameters

Q: Is this one tail or two tail?

Q: Find the P-value and which of the following is the correct conclusion?

a) There is no statistical evidence of difference in yields between the two fertilizers (p>0.15)
b) There is a borderline statistically significant difference in the yields between the two fertilizers(0.10<p<0.15)
c) There is evidence of a statistically significant different in the yields between fertilizer A and B (0.05<p<0.10)
d) There is evidence of a statistically significant difference in the yields between both fertilizers (0.01<p<0.05)
e) There is evidence of a statistically difference in the yields between the two fertilizers (p<0.01)

14. When conducting a large sample test of $H_0 : p = p_0$ for a single proportion, the test statistic is $z = \frac{(\hat{p} - p_0)}{\sqrt{\frac{p_0(1-p_0)}{n}}}$, where $\hat{p}$ is the sample proportion. Which of the following best explains the justification for the denominator of this test statistic?

(A) The standard deviation of $\hat{p}$ is known when the null hypothesis is true.

(B) The standard deviation of $\hat{p}$ is known when the alternative hypothesis is true.

(C) The sample size is large and therefore the standard deviation of p_0 is approximated well.

(D) The standard deviation of p_0 is known when the null hypothesis is true.

(E) The standard deviation of p_0 is known when the alternative hypothesis is true.

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20. Suppose that on a hypothesis test for a single population mean, H_a: $\mu < 10$. Assume that H_a is true. For a fixed sample size and significance level α, the power of the test will be greatest if the actual mean is which of the following?

(A) 8
(B) 9
(C) 10
(D) 11
(E) 13

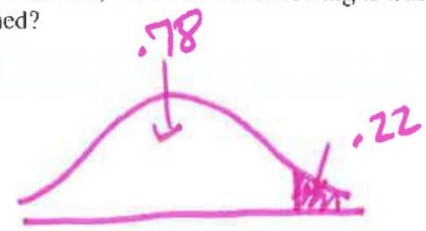
power is the probability that the test will correctly lead to the rejection of a false null hypothesis so the lower the mean, the greater the power in this case

Put this question into review lesson on two tailed hypothesis testing:

Q: An experiment was conducted on a two-tailed hypothesis test on a set of data and obtained a p-value of 0.38. If the experiment was conducted on a one-tail test on the same set of data, what P-value(s) would have been obtained?

28. An experimenter conducted a two-tailed hypothesis test on a set of data and obtained a p-value of 0.44. If the experimenter had conducted a one-tailed test on the same set of data, which of the following is true about the possible p-value(s) that the experimenter could have obtained?

(A) The only possible p-value is 0.22.
(B) The only possible p-value is 0.44.
(C) The only possible p-value is 0.88.
(D) The possible p-values are 0.22 and 0.78.
(E) The possible p-values are 0.22 and 0.88.



27. A manufacturer claims its Brand A battery lasts longer than its competitor's Brand B battery. Nine batteries of each brand are tested independently, and the hours of battery life are shown in the table below.

two samples

Brand A	88	85	80	81	72	90	85	85	84
Brand B	80	79	77	82	75	81	77	73	78

Provided that the assumptions for inference are met, which of the following tests should be conducted to determine if Brand A batteries do, in fact, last longer than Brand B batteries?

$\mu_A > \mu_B$ so one sided

(A) A one-sided, paired t-test
(B) A one-sided, two-sample t-test
(C) A two-sided, two-sample t-test
(D) A one-sided, two-sample z-test
(E) A two-sided, two-sample z-test

31. A large number of randomized experiments were conducted to determine whether taking a particular drug regularly would decrease the chance of getting a certain disease. For each of the experiments, the drug effect is the difference between the proportion of people taking the drug who got the disease and the proportion of people taking a placebo who got the disease. If the drug had no effect whatsoever, which of the following experimental results would be anticipated?

I. p-values will be greater than 0.05 for about 95 percent of the experiments.

II. There will be about an equal number of experiments showing positive and negative values of drug effect.

III. When 95 percent confidence intervals for the population drug effect are constructed, those confidence intervals include 0 about 95 percent of the time.

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) I, II, and III

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22. A random sample of 50 students at a large high school resulted in a 95 percent confidence interval for the mean number of hours of sleep per day of (6.73, 7.67). Which of the following statements best summarizes the meaning of this confidence interval?

(A) About 95% of all random samples of 50 students from this population would result in a 95% confidence interval of (6.73, 7.67).

(B) About 95% of all random samples of 50 students from this population would result in a 95% confidence interval that covered the population mean number of hours of sleep per day.

(C) 95% of the students in the survey reported sleeping between 6.73 and 7.67 hours per day.

(D) 95% of the students in this high school sleep between 6.73 and 7.67 hours per day.

(E) A student selected at random from this population sleeps between 6.73 and 7.67 hours per day for 95% of the time.

24. A random sample of 432 voters revealed that 100 are in favor of a certain bond issue. A 95 percent confidence interval for the proportion of the population of voters who are in favor of the bond issue is

(A) $100 \pm 1.96\sqrt{\frac{0.5(0.5)}{432}}$

(B) $100 \pm 1.645\sqrt{\frac{0.5(0.5)}{432}}$

(C) $100 \pm 1.96\sqrt{\frac{0.231(0.769)}{432}}$

(D) $0.231 \pm 1.96\sqrt{\frac{0.231(0.769)}{432}}$

(E) $0.231 \pm 1.645\sqrt{\frac{0.231(0.769)}{432}}$

z^* for 95% $= 1.96$

$\hat{p} = 0.231$

$\hat{p} \pm z^* \sqrt{\frac{\hat{p}\hat{q}}{n}}$

$0.231 \pm 1.96\sqrt{\frac{(.231)(.769)}{432}}$

26. In 2009 a survey of Internet usage found that 79 percent of adults age 18 years and older in the United States use the Internet. A broadband company believes that the percent is greater now than it was in 2009 and will conduct a survey. The company plans to construct a 98 percent confidence interval to estimate the current percent and wants the margin of error to be no more than 2.5 percentage points. Assuming that at least 79 percent of adults use the Internet, which of the following should be used to find the sample size (n) needed?

(A) $1.96\sqrt{\frac{(0.5)}{n}} \le 0.025$

(B) $1.96\sqrt{\frac{(0.5)(0.5)}{n}} \le 0.025$

(C) $2.33\sqrt{\frac{(0.5)(0.5)}{n}} \le 0.05$

(D) $2.33\sqrt{\frac{(0.79)(0.21)}{n}} \le 0.025$

(E) $2.33\sqrt{\frac{(0.79)(0.21)}{n}} \le 0.05$

$ME = z^* \sqrt{\frac{(\hat{p})(\hat{q})}{n}}$

$0.025 \ge 2.33 \sqrt{\frac{(.79)(.21)}{n}}$

z^* for 98% = 2.326