There are five possible responses to each of the following multiple choice questions. There is only one "BEST" answer. Be sure to read all possible choices before selecting your answer. You may mark on this examination. You can use a calculator but a calculator manual cannot be used.

## Form C

Please circle your answer to each question and fill the blank sheet. After you finish the exam, log into D2L and input your answers under the right quiz item. There are a total of 43 questions.

- If your test is Form A, take Quiz item Final Form A.
- If your test is Form B, take Quiz item Final Form B.
- If your test is Form C, take Quiz item Final Form C.
- If your test is Form D, take Quiz item Final Form D.

| CONFIDENCE LEVEU | $90 \%$ | $95 \%$ | $99 \%$ |
| :--- | :---: | :---: | :---: |
| $z^{*}$ | 1.645 | 1.96 | 2.576 |

1. Which of these questions from the Fall 2013 MATH1530 class survey produced variables that are quantitative?
i. What best describes what you'll do when you reach your spring break destination? (Beach, Ski, Cruise, Visit Family/Friends, Community Service, Other).
ii. How many Facebook friends do you have?
iii. What is your average one-way commute time (in minutes) from home to ETSU?
iv. How will you travel to your destination? (Car, Airplane, Bus, Train, and Other).
v. Are you right-handed, left-handed, or ambidextrous (able to use the right and left hands equally well)?
(A) ii.
(B) iii.
(C) i, iii.
(D) ii, iii.
(E) i, iv, v.
2. Is there a favorite color of the rainbow? The Fall 2013 MATH1530 class survey asked "What is your favorite color of the rainbow?" Assume that the students who responded to the survey are from an SRS of all ETSU students. The bar graph below is the distribution of favorite color from the survey of 695 students.


Which of the following best describes the distribution?
(A) The distribution is U-shaped.
(C) The distribution is bimodal and slightly skewed right.
(B) The distribution is bimodal.
(D) Blue is the favorite color.
(E) The center of the graph is orange.
3. In the Fall 2013 MATH1530 class survey data, the variable "COMMUTING" is the average one-way commute time (in minutes) from their home to ETSU for each participant. Here are the times of 9 randomly selected students:

| 15 | 15 | 0 | 30 | 0 | 9 | 11 | 25 | 5 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

The median of the 9 commuting times is
(A) 12.2
(B) 11
(C) 10
(D) 5
(E) 0
4. The table below represents the responses to a survey question "What do you typically drink with dinner?" Which type of graph is appropriate for these data?

| Drink with Dinner | Counts |
| :--- | :---: |
| Alcohol | 17 |
| Milk | 76 |
| Soda | 209 |
| Tea | 161 |
| Water | 363 |
| Other | 53 |

(A) Bar chart
(B) Histogram
(C) Stem plot
(D) Scatterplot
(E) Boxplot
5. The Fall 2013 MATH1530 class survey asked "What is your estimated cost in US dollars for food and drinks of your spring break trip?" Here is the histogram of the responses from the male students.


The overall shape of this distribution is
(A) uniform.
(C) strongly skewed right with possible outliers.
(B) normally distributed.
(D) strongly skewed left with possible outliers.
(E) somewhat symmetric.

Use the following for the next 3 questions. The Fall 2013 MATH1530 research assignment asked students to estimate cost for food and drinks of their trip during spring break. The boxplot and descriptive statistics below summarize the student responses by gender of the cost in dollars.


Descriptive Statistics: COST_FOOD (in dollars)

| Variable | GENDER | N | N* | Mean | SE Mean | StDev | Min | Q1 | Median | Q3 | Max |
| :--- | :--- | ---: | ---: | ---: | ---: | :--- | :--- | ---: | ---: | ---: | ---: |
| COST_FOOD | Female | 421 | 15 | 247.5 | 10.9 | 223.8 | 0 | 100 | 200 | 300 | 1500 |
|  | Male | 249 | 10 | 221.2 | 11.3 | 178.2 | 0 | 100 | 200 | 300 | 1000 |

6. Based on the above information, which of the following descriptions is FALSE?
(A) The mean is larger than the median in both distributions.
(B) The two distributions cannot be compared using a side-by-side boxplot because there were more responses from females.
(C) There is more diversity in the cost of food and drinks for the females than for the males.
(D) There are more outliers in the cost of food and drinks for the females than for the males.
(E) The interquartile range of the cost is the same for both groups.
7. About what percent of the males estimate that their food and drink costs would be at most $\$ 100$ ?
(A) $75 \%$
(C) $z=\frac{100-221.2}{178.2}=-.68$ (Area under Normal curve $=.2483$ )
(B) $50 \%$
(D) $\frac{100-0}{1000-0}=10 \%$
(E) $25 \%$
8. Which of the following measures should be used to describe the distribution of food and drink cost for the females?
(A) $\bar{x}=247.5, s=223.8$.
(C) Median $=200, s=223.8$.
(B) $\operatorname{Min}=0, Q_{1}=100, \bar{x}=247.5, Q_{3}=300, \operatorname{Max}=1500$.
(D) Median $=200, \bar{x}=247.5$.
(E) $\operatorname{Min}=0, Q_{1}=100$, Median $=200, Q_{3}=300, \operatorname{Max}=1500$.

Use the following information for the next 4 questions. Visual problems associated with the use of visual display terminals (VDTs) have become rather common in recent years. Some researchers have focused on vertical gaze direction (VGD) as a source of eye strain and irritation. This direction is known to be closely related to ocular surface area (OSA), so a method of measuring OSA is needed. Since it is fairly easy to measure the width of the palprebal fissure (PF) which is the horizontal width of the eye opening, interest is on the relationship between OSA and the width of PF. The accompanying scatterplot shows the observations from a dataset and the relationship between OSA (in $\mathrm{cm}^{2}$ ) and the width ofPF (in cm). (Data obtained from the article, "Analysis of Ocular Surface Area for Comfortable VDT Workstation Layout" in Ergonomics, 1996: 877-884.) The least-squares regression line for predicting OSA from Width of PF is

$$
\mathrm{OSA}=-0.3977+3.080 \times \text { Width of } \mathrm{PF}
$$


9. What is the correlation $(r)$ between OSA and Width of PF?
(A) 0.937
(B) 0.968
(C) .878
(D) -0.3977
(E) 0.308
10. Which of the following best describes the relationship between OSA and Width of PF?
(A) The relationship is curved.
(B) The relationship is weak because the points are scattered around the line.
(C) The relationship is skewed right because more data are on the right direction.
(D) There seems to be a strong negative linear relationship between the two variables.
(E) There seems to be a strong positive linear relationship between the two variables.
11. Which of the following is the correct interpretation of the slope of the least-squares regression line?
(A) As Width of PF increases by $1 \mathrm{~cm}, O S A$ will decrease by about $0.3977 \mathrm{~cm}^{2}$ on the average.
(B) As Width of PF increases by $1 \mathrm{~cm}, O S A$ will increase by about $3.08 \mathrm{~cm}^{2}$ on the average.
(C) As OSA increases by $1 \mathrm{~cm}^{2}$, Width of $P F$ will increase by about 3.08 cm on the average.
(D) As Width of PF increases by 1 cm, OSA will increase by about $93.7 \%$ on the average.
(E) When Width of $P F$ is $1 \mathrm{~cm}, O S A$ will be $2.7 \mathrm{~cm}^{2}$ on the average.
12. Use the least-squares regression line to predict $O S A$ when Width of $P F$ is 1.5 cm .
(A) Any value between 1 and $5 \mathrm{~cm}^{2}$.
(C) $(0.937)(1.5)=1.41 \mathrm{~cm}^{2}$
(B) Any value between 0.5 cm and 1.75 cm .
(D) $-0.3977+(3.080)(1.5)=4.22 \mathrm{~cm}^{2}$
(E) $(3.08)(1.5)=4.62 \mathrm{~cm}^{2}$
13. Demographics for the 50 states in the USA can be found at http://quickfacts.census.gov/qfd/states. One of the interesting facts that can be found at the site is the percentage of people in each state, age 25 years or older, who have a Bachelors degree or higher (for years 2007-2011). There is also information given about several other variables measured over the same time period for each state in the union, some of which are listed below. Which of them is mostly likely to have a negative relationship with the percentage of state residents having Bachelors or higher degrees?
(A) The median household income(\$).
(C) The percentage of persons living below the poverty level.
(B) The percentage of high school graduate or higher.
(D) The median value (\$) of owner-occupied housing units.
(E) The homeownership rate.
14. In a study of the relationship for senior citizens between physical activity and frequency of colds, participants were asked to monitor their weekly time spent in exercise over a five-year period and frequency of colds. The study demonstrated that a negative statistical relation exists between time spent in exercise and frequency of colds. The investigator concluded that increasing the time spent in exercise is an effective strategy for reducing the frequency of colds for senior citizens. This is an example of
(A) an experiment.
(C) an double blind experiment.
(B) an observational study, not an experiment.
(D) a matched pairs experiment.
(E) a stratified experiment.
15. A bottled water company designed a study to demonstrate that water drinkers prefer bottled water when they taste both bottled and tap water. The subjects, all water drinkers, tasted both the types of water from cups without brand identification and said which they liked better. Because responses depend on which water type is tasted first, the order of tasting was chosen at random for each subject. This study uses
(A) an observational study.
(C) double blinding.
(B) stratified sampling.
(D) random placebo.
(E) a matched pair design.
16. A question posted on a web site asked visitors to the site to say whether they thought marijuana should be legally available. Are there any potential sources of bias and what conclusions can be drawn from this survey?
(A) We would need to know the margin of error before we can draw a conclusion from this survey.
(B) We should be able to estimate the percentage of the population who think marijuana should be legalized from this survey.
(C) No. The results will produce a yes or no response and the binomial distribution can be used to draw conclusions about the population.
(D) Yes. Since this is a voluntary response sample, those who visit the site and respond may be predisposed to a particular answer. It would be difficult to generalize the results to the population.
(E) No. As long as the sample size is large we are able to draw conclusions about the population.
17. A fair coin is tossed, and you win a dollar if there are more than $60 \%$ heads. Which of the following is better?
(A) 100 tosses would be better than 10 tosses because the law of large numbers tells us as the number of tosses goes up, the percentage of heads is likely to be closer to $50 \%$.
(B) Whether the coin is tossed 10 times or 100 times your chance of winning $\$ 1$ would be the same.
(C) We should require the number of tosses to be at least 1000.
(D) There is a $50 \%$ chance that you win a dollar if there are more than $60 \%$ heads on any number of tosses.
(E) 10 tosses would be better than 100 tosses because the law of large numbers tells us as the number of tosses goes up, the percentage of heads is likely to be closer to $50 \%$.

Use the following for the next 4 questions. Do antioxidants prevent cancer? People who eat lots of fruit and vegetables have lower rates of colon cancer than those who eat little of these foods. Fruits and vegetables are rich in "antioxidants" such as vitamins A, C, and E. Will taking antioxidants help prevent colon cancer? A researcher studied this question with 864 people who were at risk of colon cancer. The subjects were randomly assigned into four groups: daily beta-carotene, daily vitamins C and E, all three vitamins every day, or daily placebo. The researcher followed the groups for 4 years.
18. The subjects in this study are
(A) antioxidants.
(C) people who eat little fruit and vegetables.
(B) the 864 people who were at risk of colon cancer.
(D) people who eat lots of fruit and vegetables.
(E) the researcher.
19. The factor in this study is
(A) the 864 people who were at risk of colon cancer.
(C) colon cancer.
(B) the researcher.
(D) fruits and vegetables.
(E) antioxidants.
20. The response in this study is
(A) the 864 people who were at risk of colon cancer.
(C) colon cancer.
(B) the researcher.
(D) fruits and vegetables.
(E) antioxidants.
21. This study would be double blind if
(A) the four diets cannot be distinguished.
(B) the final results are "statistically significant."
(C) the 864 people did not know which diet other people received.
(D) neither the 864 people nor the researcher was allowed to see each other during the session.
(E) neither the 864 people nor the researcher know which diet each person received.
22. A local university decides to evaluate the distribution of grades for a recently revamped online course. The probability distribution of the students grades is given below.

| Grade | A | B | C | D | F |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Probability | 0.09 | 0.27 | 0.34 | 0.19 | 0.11 |

What is the probability that a randomly chosen student received a grade of B or higher?
(A) $2 / 5$
(B) $1 / 5$
(C) 0.09
(D) 0.36
(E) 0.27
23. In a city where it rains frequently, records have been kept and relative frequencies have been used to estimate these probabilities. The probability that rain is predicted on a day is 0.2 . The probability that it actually rains on a day that rain is predicted is 0.9 . The probability that it actually rains on a day that rain is not predicted is 0.3 . For a randomly selected day, what is the probability that it does rain? (Hint: Use a tree diagram.)
(A) .18
(B) .24
(C) .42
(D) .3
(E) .9
24. Female students in the spring 2013 class survey had heights that were approximately Normally distributed with a mean of 64.86 inches and a standard deviation of 3.25 . Suppose we took a sample of 25 female students from the population of all the students who took the survey. What is the probability that the mean height of the 25 female students would be between 63.5 and 65.1 inches?
(A) .9675
(B) .9573
(C) . 6260
(D) .1907
(E) .0427

Use the following information for the next 4 questions. The level of pesticides found in the blubber of whales is a measure of pollution of the oceans by runo from land. We focus here on a substance called dieldrin. The FDA wants raw food to have no more than $100 \mathrm{ng} / \mathrm{g}$ of dieldrin. A random sample of 8 whales is drawn from a region of the North Atlantic and the dieldrin in their blubber is measured. Their mean content of dieldrin is $357 \mathrm{ng} / \mathrm{g}$. Assume that the standard deviation for dieldrin in the population of whales is $50 \mathrm{ng} / \mathrm{g}$. Suppose that the concentration in all such whales has an approximately normal distribution.
25. We want to perform a hypothesis testing to see if the mean content of dieldrin for the population of whales in that region has gone beyond the threshold set by the FDA. The null and the alternative hypotheses are
(A) $H_{0}: \bar{x}=357$ vs. $H_{a}: \bar{x}>357$
(C) $H_{0}: \bar{x}=100$ vs. $H_{a}: \bar{x}>100$
(B) $H_{0}: \mu=357$ vs. $H_{a}: \mu>357$
(D) $H_{0}: \mu=100$ vs. $H_{a}: \mu>100$
(E) $H_{0}: p=100$ vs. $H_{a}: p>100$
26. The p-value of the above test is extremely small, almost 0 . Which of the following is most appropriate?
(A) The probability that the null hypothesis is true is 0 .
(B) The probability of rejecting the null hypothesis when it is true is almost 0
(C) The probability of getting a random sample of 8 whales with mean greater than 100 is almost 0 .
(D) It is almost impossible to get a sample of 8 whales with mean of exactly 357 when the true mean dieldrin in the population of whales is at the threshold level of 100 set by the FDA.
(E) It is almost impossible that the mean dieldrin for a random sample of 8 whales is 357 or more when the true mean dieldrin in the population of whales is at the threshold level of 100 set by the FDA.
27. A $95 \%$ confidence interval for the mean dieldrin in the blubber of the population of whales, $\mathrm{in} \mathrm{ng} / \mathrm{g}$, is
(A) $357 \pm 98$.
(B) $357 \pm 34.65$.
(C) $357 \pm 12.25$.
(D) $100 \pm 34.65$.
(E) $100 \pm 12.25$.
28. What is the meaning of the $95 \%$ confidence in this context?
(A) 0.95 is the probability that the mean content of dieldrin in this population of whales is equal to $357 \mathrm{ng} / \mathrm{g}$.
(B) 0.95 is the probability that the mean content of dieldrin in this population of whales is equal to $100 \mathrm{ng} / \mathrm{g}$.
(C) $95 \%$ of the whales have their dieldrin content in the confidence interval we produce.
(D) If we drew all the possible samples of size 8 from this population of whales and constructed confidence intervals using that procedure, approximately $95 \%$ of those confidence intervals would contain the true mean of dieldrin in the blubber of this population of whales.
(E) The probability that the $100 \mathrm{ng} / \mathrm{g}$ is in the confidence interval we produce is 0.95 .
29. There have been anecdotal reports of the ability of duct tape to remove warts. In an experiment, 100 patients in a study having warts were randomly assigned to use duct tape or placebo. After ten weeks, the warts had disappeared for $10 \%$ of the duct tape group and $6 \%$ of the placebo group. However, the difference was declared to be "not statistically significant." Explain what this means.
(A) The difference was not large enough to support that the observed effect was due to something other than random variation.
(B) The p-valve was small so reject $H_{0}$.
(C) Do not reject $H_{0}$ since the $6 \%$ of the placebo group is larger than $5 \%$.
(D) Reject $H_{0}$ since the difference between the two groups is $4 \%$, which is smaller than $5 \%$.
(E) If the difference is not statistically significant then the results are not of practical significance.
30. An airline wants to know the average time it takes their passengers to claim their luggage. Prior knowledge indicates that the time to claim luggage for this airline is normally distributed with mean $\mu$ and standard deviation $\sigma=5$ minutes. The airline plans to take a simple random sample of their passengers to estimate $\mu$ with a $90 \%$ confidence interval. How many passengers must the airline sample to get a margin of error of 2 minutes?
(A) 34
(B) 5
(C) 24
(D) 17
(E) Cannot be determined without $\bar{x}$ value.

Use the following information for the next 4 questions. From the Fall 2013 Math 1530 Class survey, we asked the question "Are you right-handed, left-handed, or ambidextrous (able to use the right and left hands equally well)?" We would like to know about the proportion of current ETSU students that identify themselves as being ambidextrous. Assume that the survey represents an SRS of current ETSU students. The data is summarized below:

| HANDEDNESS | Count | Percent |
| ---: | ---: | ---: |
| Ambidextrous | 27 | 3.88 |
| Left-handed | 68 | 9.77 |
| Right-handed | 601 | 86.35 |
| $\mathrm{~N}=$ | 696 |  |

31. What is the population of interest in this survey?
(A) The 27 students who identify themselves as being ambidextrous.
(B) The 696 students who responded to the question.
(C) Current ETSU students.
(D) Current MATH1530 students.
(E) Current MATH1530 students who identify themselves as being ambidextrous.
32. What is the sample in this survey?
(A) Current ETSU students.
(B) Current MATH1530 students.
(C) Current ETSU students who identify themselves as being ambidextrous.
(D) The 696 students who responded to the question.
(E) Current MATH1530 students who identify themselves as being ambidextrous.
33. What is the estimated value of the population proportion if we are interested in the proportion of current ETSU students that identify themselves as being ambidextrous?
(A) $27 / 696=3.88 \%$
(C) $601 / 696=86.35 \%$
(B) $68 / 696=9.77 \%$
(D) $669 / 696=96.12 \%$
(E) Unable to tell from the given information
34. A $95 \%$ confidence interval of the above population proportion is $(0.024,0.053)$. You do not need to verify this it is true. Which of the following interprets this confidence interval correctly.
(A) We are $95 \%$ confident that the true proportion of all future MATH1530 students that identify themselves as being ambidextrous fall inside the calculated interval.
(B) We are $95 \%$ confident that the proportion of the 696 students in the sample that identify themselves as being ambidextrous fall inside the calculated interval.
(C) We are $95 \%$ confident that the sample proportion of any group of 696 ETSU students that identify themselves as being ambidextrous fall inside the calculated interval.
(D) We are $95 \%$ confident that the true proportion of current ETSU students that identify themselves as being ambidextrous fall inside the calculated interval.
(E) We are $95 \%$ confident that the true proportion of current MATH1530 students that identify themselves as being ambidextrous fall inside the calculated interval.
35. The headline of a Reuters news article posted at the Yahoo Health News website February 18, 1998 was "Spring Birthday Confers Height Advantage." The article describes an Austrian study of the heights of 507,125 military recruits. In an article in the journal Nature, the researchers reported their finding that men born in the spring were, on average, about $1 / 4$ of an inch taller than men born in the fall. The difference earned the title statistically significant. The most likely explanation of the result being statistically significant is
(A) the p-value is large.
(C) it is based on a very small random sample.
(B) the test of hypotheses is not rejected.
(D) it is based on a very large random sample.
(E) the size of the sample doesn't have any effect on the significance of the test.
36. A Gallup (known, reputable, professional, polling organization) poll asked the question, "With which one of these statements about the environment and the economy do you most agree? Protection of the environment should be given priority, even at the risk of curbing economic growth. OR, Economic growth should be given priority, even if the environment suffers to some extent." A random sample of 1,012 adults nationwide were contacted and surveyed. In all, $51 \%$ of the sample said that Economic growth should be given priority, even if the environment suffers to some extent. Gallup announced the polls margin of error for $95 \%$ confidence as $\pm 3$ percentage points. Which of the following sources of error are included in the margin of error?
(A) Variability due to random sampling (or sampling variability).
(B) The people who were missed because that they do not have phones.
(C) Nonresponse - some people just don't like to respond to surveys.
(D) Variability due to the person who asked the question.
(E) All sources of error are covered by the margin of error - that is why it is called the "margin of error."

## Use the following for the next 2 questions.

In the fall 2013 MATH1530 class survey data, the variable "COMMUTING" is the average one-way commute time (in minutes) from their home to ETSU for each participant. Based on the data, we want to know whether there is good evidence that on average the commute time for male students is longer than for female students at ETSU. The statistics are

| GENDER | N | Mean | StDev | SE Mean |
| :--- | ---: | ---: | ---: | ---: |
| Female | 436 | 13.8 | 21.4 | 1.0 |
| Male | 259 | 16.5 | 26.0 | 1.6 |

37. To perform the hypothesis testing, what analysis should we conduct?
(A) One sample $t$ test.
(C) Two sample t test.
(B) One sample $z$ test.
(D) A matched pairs t test.
(E) A Chi-square test.
38. The appropriate analysis was performed and the P-value is 0.081 . Which of the following options answers the research question? Use $\alpha=0.1$.
(A) The P-value is so large that we will not reject the null hypothesis. There is not strong evidence that on average the commute time for male students is longer than for female students at ETSU.
(B) The P -value is larger than $\alpha$ so we will reject the null hypothesis. There is not strong evidence that on average the commute time for male students is longer than for female students at ETSU.
(C) The P -value is smaller than $\alpha$ so we will not reject the null hypothesis. There is not strong evidence that on average the commute time for male students is longer than for female students at ETSU.
(D) The P -value is smaller than $\alpha$ so we will reject the null hypothesis. There is strong evidence that on average the commute time for male students is longer than for female students at ETSU.
(E) Cannot draw valid conclusion since more female students responded to the survey than male students.
39. An article, "18-24-Year-Olds on Facebook Boast an Average of 510 Friends", was published on April 3, 2013 (http://www . marketingcharts.com/). The fall 2013 MATH1530 class survey asked students, "How many Facebook friends do you have?" We want to test whether MATH1530 students have fewer Facebook friends than the general population in the article with some sample data. A random sample of 50 responses were selected from the survey dataset. Their responses had a sample mean of 439 with standard deviation 284. What does this sample suggest about the average number of Facebook friends of MATH1530 students? Only one of the following four Minitab outputs is correct.
```
Output 1:
One-Sample T
Test of mu = 510 vs < 510
    95% Upper
\begin{tabular}{rrrrrrr} 
N & Mean & StDev & SE Mean & Bound & T & P \\
50 & 439.0 & 284.0 & 40.2 & 506.3 & -1.77 & 0.042
\end{tabular}
```



```
Output 2:
One-Sample T
Test of mu = 510 vs not = 510
    N Mean StDev SE Mean 95% CI T P
50 439.0 284.0 40.2 (358.3, 519.7)
----------------------------------------------------
Output 3:
One-Sample Z
Test of mu = 510 vs < 510
The assumed standard deviation = 284
                95% Upper
\begin{tabular}{rrrrrr}
\(N\) & Mean & SE Mean & Bound & Z & P \\
50 & 439.0 & 40.2 & 505.1 & -1.77 & 0.039
\end{tabular}
----------------------------------------------------
Output 4:
One-Sample Z
Test of mu = 510 vs not = 510
The assumed standard deviation = 284
\begin{tabular}{rrrcrr} 
N & Mean & SE Mean & \(95 \%\) CI & Z & P \\
50 & 439.0 & 40.2 & \((360.3,517.7)\) & -1.77 & 0.077
\end{tabular}
```

Which of the following options answers the research question at $\alpha=0.05$ ?
(A) Output 1; There is significant evidence to suggest that current MATH1530 students have fewer Facebook friends than the general population in the article.
(B) Output 2; A 95\% confidence interval for the average number of Facebook friends for current MATH1530 students is anywhere from 358 to 520 . Since this interval contains 510, there is not enough evidence to suggest that current MATH1530 students have fewer Facebook friends than the general population in the article.
(C) Output 3; There is significant to suggest that current MATH1530 students have fewer Facebook friends than the general population in the article.
(D) Output 4; We are $95 \%$ confident that the average number of Facebook friends for current MATH1530 students is about 360 to 518. Hence, there is not strong evidence that current MATH1530 students have fewer Facebook friends than the general population in the article.
(E) All outputs provide the same value of the test statistic -1.77 . Hence, we can use any of them and the research question can be addressed at different $\alpha$ levels.

Use the following for the next 3 questions. A survey of ETSU students was recently completed asking students their opinion about the addition of football to the campus. Three options were given: For, Against, and No Opinion. The distribution of counts is shown below in the table. Choose a student at random from this group.

## Tabulated statistics: Gender, OPINION_FOOTBALL

Rows: Gender Columns: OPINION_FOOTBALL

|  | For | Against | No opinion | All |
| :--- | :---: | :---: | :---: | :---: |
| Male | 218 | 49 | 28 | 295 |
| Female | 153 | 72 | 85 | 310 |
| All | 371 | 121 | 113 | 605 |

Cell Contents: Count
40. The probability that a student was a male and in support of the addition of football is
(A) $218 / 605$ or .3603
(B) $295 / 605$ or .4876
(C) $218 / 371$ or .5876
(D) $218 / 295$ or .74
(E) $371 / 605$ or .6132
41. The conditional probability that the student was in support of the addition of football, given that the student was male is
(A) $218 / 605$ or .3603
(B) $295 / 605$ or .4876
(C) $218 / 371$ or .5876
(D) $218 / 295$ or .74
(E) $371 / 605$ or .6132
42. The conditional probability that the student was a male, given that the student was in support of the addition of football is
(A) $218 / 605$ or .3603
(B) $295 / 605$ or .4876
(C) $218 / 371$ or .5876
(D) $218 / 295$ or .74
(E) $371 / 605$ or .6132
43. A Chi-square test was performed for the above two-way table and the Minitab output shows the related information.

$$
\text { Chi-Sq }=44.168, \mathrm{DF}=2, \mathrm{P}-\text { Value }=0.000
$$

What is the correct conclusion of this analysis? (Use $\alpha=0.05$. )
(A) There is a relationship between gender and the opinion of ETSU students on the addition of football to the campus. The proportion of male students in support of the addition of Football is much larger than that of female students.
(B) There is no relationship between gender and the opinion of ETSU students on the addition of football to the campus. More students would support regardless of their gender.
(C) There is a relationship between gender and the opinion of ETSU students on the addition of football to the campus because there are more males than females in the dataset.
(D) Since the $P$-value is 0 , there is no difference in the opinions between male and female students.
(E) Since the $P$-value is small we conclude that gender and the opinion of ETSU students are independent.

