STA 2e: Sect. 5.2 Worksheet   **Name** _____

MARGIN OF ERROR AND CONFIDENCE INTERVALS

1. The local school board posts average SAT Math scores for each high school in the district. For one particular high school, the average math score is given as 516. A statistics teacher at that high school thinks that this is too high. He takes a random sample of 100 students and finds that their average SAT Math score is 486.

    Population: _____

    Sample: _____

    Parameter: _____

    Statistic: _____

2. Students in a statistics class weighed 30 bags of regular size M&M=s and found that the average weight of the 30 bags excluding the wrapper was 1.75 ounces. The Mars Company gives the net weight as 1.69 ounces.

    Population: _____

    Sample: _____

    Parameter: _____

    Statistic: _____

3. Maria wants to determine if her 6-sided die is really fair, i.e., each face has the same chance of occurring. She rolls the die 300 times and gets a A5" 48 times, or 0.16.

    Population: _____

    Sample: _____

    Parameter: _____ *(proportion)*

    Statistic: _____ *(proportion)*

4. If you use the sample proportion $\hat{p}$ from a simple random sample of size *n* to estimate an unknown population proportion *p*, then the **margin of error** for 95% confidence is roughly equal to _____

5. When constructing a 95% confidence interval for proportions, what would be the approximate margin of error for a sample size of 200 people?

    _____

6. When constructing a 95% confidence interval for proportions, what would be the approximate margin of error for a sample size of 800 people?

    _____

7. By Increasing the sample size, the margin of error becomes _____*(larger/smaller)* and the length of the confidence interval _____ *(widens/narrows)*.

For #8 - 12: A doctor noticed that many female patients were Vitamin D deficient. She would like to determine what proportion of her patients are deficient. She chooses a random sample of 45 medical files of female patients and finds that 37 of these patients are Vitamin D deficient.

8. What is the margin of error for a 95% confidence interval?   _____

9. Construct the 95% confidence interval.   _____

10 Make a 95% confidence statement about the percent of the doctor's female patients are Vitamin D deficient.

    _____

    _____

11. The doctor is unhappy with the confidence interval. It is so wide that she does not feel that she has a good estimate of the proportion of patients with Vitamin D deficiency. What could she do to narrow the interval?

    _____

12. If she increases the number of patient files in her sample to 180, what will happen to the margin of error?

    _____

For #13 - 17: George Sanchez is running for mayor of a city with a voting population of approximately 250,000. He has only one opponent. Three months before the election, George pays a polling company to survey voters to find what proportion of all voters plan to vote for him.

13. The polling company surveys 500 voters and find that 236 voters plan to vote for George. Construct a 95% confidence interval for the proportion of all voters who intend to vote for George.   _____

14. Make a confidence statement about the percent of all voters in the city who plan to vote for George.

    _____

    _____

15. As the day of the election drew closer, the polling company increased the sample size. For the polling company, this increase means more money. George knows little statistics. Explain to him why increasing the sample size is important to him.

    _____

    _____

16. Luckily, George has raised a lot of campaign money and can afford to do several polls leading up to the election. Complete the table using a 95% confidence interval for each.

	3 months before the election	2 months before the election	4 weeks before the election	2 weeks before the election
Sample Size	500	1000	1500	2000
Number voting for George	236	472	708	944
Sample proportion voting for George				
Margin of Error				
Confidence Interval (use 3 significant digits)				

17. If George gets more than 50% of the votes, he will be the next mayor. In the table above, what is the smallest sample size for which 50% is no longer in the interval. _____

    Does this mean that George absolutely will not win? Explain your answer.

    _____

    _____