Answer each of the twenty-five questions below on the scantron sheet using a number two-pencil. Be sure to bubble in your STAT110 ID (as passed around) and mark which form you are using.

1) The mathematics department wants to determine if more computer based exercises help students learn calculus better. There are two possible designs proposed for the study:

(A) The researchers randomly assign half of the 160 students registered for the 10:10 MWF time slot to sections using the computers, and the other half to sections not using the computers. At the end of the semester they compare the students' performance on a common final exam.

(B) Offer two 10:10 MWF sections of 40 students each that use the computers, and offer two 10:10 MWF sections of 40 students that don't use the computers and allow the students to choose their section. At the end of the semester they compare the students' performance on a common final exam.

Which of these two set-ups could provide evidence that computer usage caused a change in performance?

    A) (A)
    B) (B)
    C) Both (A) and (B)
    D) Neither (A) nor (B)
    E) Can't tell from the statement of the problem

2) If a neighborhood association collects sample data about the number of speeding cars through a neighborhood by sitting on a street corner during rush hour, what type of sample has been collected?

    A) Cluster sample
    B) Convenience sample
    C) Simple random sample
    D) Stratified random sample
    E) Voluntary response sample

3) If a neighborhood association had a notice in their newsletter inviting residents to email the association president with any comments about the speeding problem, what type of sample would be collected?

    A) Cluster sample
    B) Convenience sample
    C) Simple random sample
    D) Stratified random sample
    E) Voluntary response sample

4) An experiment that always over-estimates the value it is trying to determine is said to be

    A) A census
    B) An experiment
    C) An observational study
    D) Biased
    E) Highly variable

The University of South Carolina decides to conduct a survey of its 27,488 students by telephoning a simple random sample of 400 students from the university's phone directory. Of the 400 contacted, 238 felt that it was worth raising tuition in order to ensure that courses required for students to graduate on time were always offered as scheduled, and 162 were opposed to this tuition increase.

5) The **sampling frame** in this example is:

    A) The 400 people chosen to receive the survey
    B) The 27,488 students on the USC campus
    C) The percentage of people in the sample who favor increasing tuition
    D) The percentage of people in the population who favor increasing tuition
    E) The students listed in the university telephone directory

6) The target **population** in this example is:

    A) The 400 people chosen to receive the survey
    B) The 27,488 students on the USC campus
    C) The percentage of people in the sample who favor increasing tuition
    D) The percentage of people in the population who favor increasing tuition
    E) The students listed in the university telephone directory

7) If in actuality, 562 numbers were used in order to get the 400 responses desired. What term is used to describe the 162 subjects that chose not to answer this sample survey?

    A) Dropout
    B) Nonadherer
    C) Nonresponse
    D) Refusal
    E) Undercoverage

8) If instead of using a simple random sample of 400 numbers they had used every 68th person on the list (1st, 69th, 137th, etc…), it would have been a :

    A) Cluster Sample
    B) Matched Pairs Design
    C) Multi-stage Sample
    D) Stratified Random Sample
    E) Systematic Sample

9) Wording the question in such a way that it made the problem sound more severe ("many courses would not be offered") or less severe ("only a few courses would not be offered") would likely change the outcome of the survey and misrepresent the students' actual views. This is an example of a:

    A) Nonsampling Error
    B) Processing Error
    C) Random Sampling Error
    D) Sampling Error
    E) Undercoverage

10) The **percentage** ($\hat{p}$) of those surveyed who favored the tuition increase was:

A) $\dfrac{1}{238} = 0.004 = 0.4\%$

D) $\dfrac{238}{400} = 0.595 = 59.5\%$

B) $\dfrac{1}{\sqrt{400}} = 0.050 = 5.0\%$

E) $\dfrac{162}{239} = 0.681 = 68.1\%$

C) $\dfrac{1}{\sqrt{238}} = 0.065 = 6.5\%$

11) What would the **margin of error** be at the 95% confidence level?

A) $\dfrac{1}{238} = 0.004 = 0.4\%$

B) $\dfrac{1}{\sqrt{400}} = 0.050 = 5.0\%$

D) $\dfrac{238}{400} = 0.595 = 59.5\%$

C) $\dfrac{1}{\sqrt{238}} = 0.065 = 6.5\%$

E) $\dfrac{162}{239} = 0.681 = 68.1\%$

12) The **parameter** is:

A) The 400 people chosen to receive the survey
B) The 27,488 students on the USC campus
C) The percentage of the 400 students who favor increasing tuition
D) The percentage of all USC students who favor increasing tuition
E) The students listed in the university telephone directory

13) The **statistic** is:

A) The 400 people chosen to receive the survey
B) The 27,488 students on the USC campus
C) The percentage of the 400 students who favor increasing tuition
D) The percentage of all USC students who favor increasing tuition
E) The students listed in the university telephone directory

14) It is believed that seniors and graduate students would be more concerned about having the courses they need to graduate being offered than would freshmen, sophomores, and juniors. Much like using blocks in an experiment, using a stratified random sample to help account for this would mean we could no longer use the usual formula for margin of error. It would however:

A) Reduce the bias of the parameter
B) Reduce the bias of the statistic
C) Reduce the non-sampling errors.
D) Reduce the variability of the parameter
E) Reduce the variability of the statistic

A recent poll found that 57% of South Carolina voters opposed the proposed federal bailout plan. The margin of error for this result is +/- 3 percentage points at the 95 percent confidence level.

15) Which of the following statements is true:

    A) There is a 95% chance that the percentage of people in the sample who said they favored the bailout plan is between 54% and 60%

    B) There is a 95% chance that the percentage of South Carolinians who favor the bailout is between 54% and 60%.

    C) We are 95% confident that the percentage of people in the sample who said they favored the bailout plan is between 54% and 60%.

    D) We are 95% confident that the true percentage of all South Carolinians favor the bailout is between 54% and 60%.

    E) We are between 92% and 98% confident that the true percentage of all South Carolinians favor the bailout is 57%

16) Increasing the sample size used in the survey would

    A) Reduce the bias of the parameter
    B) Reduce the bias of the statistic
    C) Reduce the non-sampling errors.
    D) Reduce the variability of the parameter
    E) Reduce the variability of the statistic

A large health study involving 5,000 male physicians was conducted to measure the effects of vitamin C and aspirin on heart disease. The doctors were divided into four groups of 1,250 each – one group received both vitamin C and aspirin, one received aspirin and a placebo, one received a placebo and vitamin C, and the other received 2 placebos. At the end of a five year span the number of heart attacks was compared across the groups. Some critics of the study complained that it did not take into account whether or not the doctors smoked or exercised regularly.

17) **Response variable(s)** in this experiment are

    A) 5,000 doctors
    B) Smoking/not-smoking and exercising regularly/not-exercising regularly
    C) Taking aspirin or placebo and taking vitamin C or a placebo
    D) The five year span of the study
    E) The number of heart attacks suffered

18) **Explanatory variable(s)** in this experiment are

    A) 5,000 doctors
    B) Smoking/not-smoking and exercising regularly/not-exercising regularly
    C) Taking aspirin or placebo and taking vitamin C or a placebo
    D) The five year span of the study
    E) The number of heart attacks suffered

19) **Lurking variable(s)** in this experiment include

    A) 5,000 doctors
    B) Smoking/not-smoking and exercising regularly/not-exercising regularly
    C) Taking aspirin or placebo and taking vitamin C or a placebo
    D) The five year span of the study
    E) The number of heart attacks suffered

20) Using only physicians will likely make it hard to:

    A) Allow for the results to be generalized to all men
    B) Control for confounding between the effects of the different explanatory variables
    C) Control for confounding between the effects of the different lurking variables
    D) Control for confounding between the effects of the explanatory and lurking variables
    E) Increase the chances that the results found are statistically significant

21) Having a large number of physicians participate should:

    A) Allow for the results to be generalized to all men
    B) Control for confounding between the effects of the different explanatory variables
    C) Control for confounding between the effects of the different lurking variables
    D) Control for confounding between the effects of the explanatory and lurking variables
    E) Increase the chances that the results found are statistically significant

22) Randomly assigning the physicians to the four groups should:

    A) Allow for the results to be generalized to all men
    B) Control for confounding between the effects of the different explanatory variables
    C) Control for confounding between the effects of the different lurking variables
    D) Control for confounding between the effects of the explanatory and lurking variables
    E) Increase the chances that the results found are statistically significant

Questions 17-25 are based on the following paragraph

A large health study involving 5,000 male physicians was conducted to measure the effects of vitamin C and aspirin on heart disease. The doctors were divided into four groups of 1,250 each – one group received both vitamin C and aspirin, one received aspirin and a placebo, one received a placebo and vitamin C, and the other received 2 placebos. The doctors were not told which medication they were receiving. At the end of a five year span the number of heart attacks was compared across the groups. Some critics of the study complained that it did not take into account whether the doctors smoked or exercised regularly.

23) An early proposal for this experiment had only two groups – one receiving both aspirin and vitamin C, and the other receiving two placebo pills. Using the actual four group design gave what benefit?

    A) Allow for the results to be generalized to all men
    B) Control for confounding between the effects of the different explanatory variables
    C) Control for confounding between the effects of the different lurking variables
    D) Control for confounding between the effects of the explanatory and lurking variables
    E) Increase the chances that the results found are statistically significant

24) One issue not addressed in the study design is what to do with doctors who failed to take some of the pills as directed (such as skipping days). These doctors would be described as:

    A) Dropouts
    F) Nonadherers
    G) Nonresponse
    H) Refusals
    I) Undercoverage

25) The doctors not being told which pills they were receiving makes this study:

    A) Completely randomized
    B) Double blind
    C) Matched pairs
    D) Single blind
    E) Statistically significant