MATH 225, Exam 3 Review Packet

Name_____ Date _____ Instructor: Keltner

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Refer to the figures and recursive rules below to answer the following question(s).

Figure 1

Figure 2

Figure 3

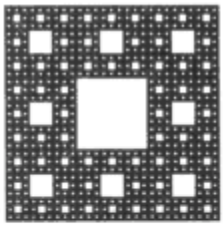

Figure 4

Rule A: • Start with a solid black equilateral triangle. • Whenever you see an edge $\frac{\text{white}}{\text{black}}$ replace it with  .
Rule B: • Start with a solid black triangle. • Whenever you see a  replace it with a  .
Rule C: • Start with a solid black square. • Whenever you see an edge $\frac{\text{white}}{\text{black}}$ replace it with  .
Rule D: • Start with a solid black square. • Whenever you see a square, subdivide the square into nine equal subsquares and remove the central subsquare.
Rule E: • Start with a solid black equilateral triangle. • Whenever you see an edge $\frac{\text{white}}{\text{black}}$ replace it with $\frac{\text{white}}{\text{black}\quad\text{black}}$.

1) Which of the figures above approximates the result of recursively applying Rule A infinitely many times? 1) _____

A) Figure 1
B) Figure 2
C) Figure 3
D) Figure 4
E) None of the above

2) Which of the figures above approximates the result of recursively applying Rule B infinitely many times? 2) _____

A) Figure 1
B) Figure 2
C) Figure 3
D) Figure 4
E) None of the above

3) Which of the figures above approximates the result of recursively applying Rule C infinitely many times? 3) _____
A) Figure 1
B) Figure 2
C) Figure 3
D) Figure 4
E) None of the above

4) Which of the figures above approximates the result of recursively applying Rule D infinitely many times? 4) _____
A) Figure 1
B) Figure 2
C) Figure 3
D) Figure 4
E) None of the above

5) Which of the figures above approximates the result of recursively applying Rule E infinitely many times? 5) _____
A) Figure 1
B) Figure 2
C) Figure 3
D) Figure 4
E) None of the above

6) Which of the figures above best approximates the Koch snowflake? 6) _____
A) Figure 1
B) Figure 2
C) Figure 3
D) Figure 4
E) None of the above

7) Which of the figures above best approximates the Sierpinski gasket? 7) _____
A) Figure 1
B) Figure 2
C) Figure 3
D) Figure 4
E) None of the above

Solve the problem.

8) If the area of the starting triangle in the construction of the Koch snowflake is 10, then the area of the Koch snowflake is 8) _____
A) 16.
B) 0.
C) 20.
D) infinite.
E) None of the above

9) Suppose that the perimeter of the starting triangle in the construction of the Koch snowflake is 10. Then the length of the boundary of the Koch snowflake is 9) _____
A) infinite.
B) 16.
C) 0.
D) 20.
E) None of the above

10) The Koch snowflake is a geometric shape with 10) _____
A) infinite area and infinite perimeter.
B) finite area and finite perimeter.
C) infinite area and finite perimeter.
D) finite area and infinite perimeter.
E) None of the above

11) If the area of the starting triangle in the construction of the Sierpinski gasket is 5, then the area of the Sierpinski gasket is 11) _____
A) 0.
B) infinite.
C) 8.
D) 10.
E) None of the above

To answer the following question(s), refer to the Mandelbrot replacement process described by:

· Start: Choose an arbitrary complex number s, called the seed of the Mandelbrot sequence. Set the seed s to be the initial term of the sequence ($s_0 = s$).

· Procedure M: To find the next term in the sequence, square the preceding term and add the seed ($s_{N+1} = s_N^2 + s$).

12) For the seed s = 2, the second and third values of the sequence (s_1 and s_2) are given by 12) _____
A) 4 and 16.
B) 2 and 2.
C) 6 and 38.
D) 6 and 42.
E) None of the above

13) For the seed s = 3, the second and third values of the sequence (s_1 and s_2) are given by 13) _____
A) 3 and 6.
B) 12 and 147.
C) 3 and 3.
D) 6 and 142.
E) None of the above

14) For the seed s = -1, the second, third, and fourth values of the sequence (s_1, s_2, and s_3) are given by 14) _____
A) 2, 3, and 7.
B) 0, 0, and 0.
C) 0, 1, and 0.
D) 0, -1, and 0.
E) None of the above

15) For the seed s = -1, the Mandelbrot replacement process 15) _____
A) gives values that have no pattern.
B) goes off to infinity.
C) is periodic.
D) gives values that get closer and closer to -1.
E) None of the above

16) If we apply the Mandelbrot replacement process to the seed $s = 2i$, then $s_1 =$ 16) _____

A) 4i.

B) -2i.

C) -4.

D) -4 + 2i.

E) None of the above

As part of a statistics project, a 6th grade teacher brings to class a container with 300 red marbles and 500 white marbles which are thoroughly mixed. To figure out how many marbles in the container are red without actually counting them all, a student randomly draws 40 marbles from the container. Of the 40 marbles drawn, 16 are red.

17) The data collection method can best be described as 17) _____

A) a controlled study.

B) a census.

C) a survey.

D) a clinical study.

E) None of the above

18) The N-value for this population is 18) _____

A) 40.

B) 800.

C) 16.

D) 300.

E) None of the above

19) The sample consists of 19) _____

A) the 800 marbles in the container.

B) the 300 red marbles in the container.

C) the 16 red marbles drawn by the student.

D) the 40 marbles drawn by the student.

E) None of the above

20) Suppose that the student is given the N-value. What is a reasonable estimate for the number of red marbles in the container? (Think of the Capture-and-Recapture example) 20) _____

A) 107

B) 320

C) 300

D) 480

E) None of the above

21) The sampling frame for this survey 21) _____

A) is larger than the target population.

B) is smaller than the target population.

C) contains members that are not in the target population.

D) is the same as the target population.

E) None of the above

22) The sampling method used in this example is called 22) _____

A) random sampling, but not simple random sampling.

B) quota sampling.

C) simple random sampling.

D) stratified sampling.

E) None of the above

A tamoxifen study claims that a combination of chemotherapy and the hormone therapy tamoxifen is more effective than tamoxifen alone in preventing breast cancer. In the study, a group of researchers from the U.S. and Canada studied 1477 postmenopausal women with early-stage breast cancer. The women were randomly assigned to one of three study groups. Group A (361 patients) received tamoxifen alone on a daily basis for five years. Group B (566 patients) received chemotherapy and tamoxifen for six months, and then completed five years of tamoxifen treatment. Group C (550 patients) received chemotherapy alone for six months followed by five years of tamoxifen treatment. All 1477 patients knew which treatment they were receiving.

23) This study can best be described as a 23) _____
A) randomized controlled experiment.
B) survey using stratified sampling.
C) survey using simple random sampling.
D) survey using quota sampling.
E) census.

24) In this study, which is the control group? 24) _____
A) Group A
B) Group B
C) Group C
D) The 1477 postmenopausal women.
E) There is no control group.

25) This study is 25) _____
A) blind, but not double-blind.
B) not blind.
C) not an experiment.
D) double-blind.
E) None of the above

In order to determine the effects of a new pill that is supposed to reduce hair loss, a researcher conducts a study. Five hundred volunteer subjects (300 men and 200 women) all of which suffer some degree of hair loss are selected to participate in the study. The researcher gives the women the real pill and the men a sugar pill, but only the researcher knows this.

26) In the experiment, which is the placebo group? 26) _____
A) the 200 women
B) the subjects that responded to the treatment
C) the 300 men
D) There is no placebo group.
E) None of the above

27) The results of this experiment are likely to be invalid <u>mostly</u> because 27) _____
A) the treatment group and control group were not the same size.
B) the subjects were volunteers.
C) the subjects did not know if they were getting the real treatment.
D) the gender of the patient could be a confounding variable in this experiment.
E) None of the above

28) Which of the following statements is true about this situation? 28) _____
A) The study is a double-blind experiment.
B) The study is a double-blind experiment, but not a blind experiment.
C) The study is not a blind experiment.
D) The study is a blind experiment, but not a double-blind experiment.
E) None of the above

A container contains a large unspecified number of ping-pong balls. A student takes 80 balls from the container, marks them with a blue dot, returns the marked balls to the container, and thoroughly mixes the balls. She then takes 80 balls again from the container. Of these, 16 have blue dots. She now wants to use this data to estimate the total number of ping-pong balls in the container.

29) The statistical method described in this example is called 29) _____
A) capture-recapture.
B) a controlled study.
C) a survey.
D) a census.
E) None of the above

30) An estimate for the number of ping-pong balls in the container is 30) _____
A) 576.
B) 400.
C) 160.
D) 480.
E) None of the above

Solve the problem.

31) A researcher interested in Cleansburg citizens' attitudes toward a revitalized downtown area surveys a randomly selected group of 200 downtown office workers. 66% of those surveyed indicated they are in favor of revitalizing the downtown area. The researcher concluded that "about two thirds of the people in Cleansburg are in favor of revitalizing the downtown area." This conclusion might be invalid because 31) _____
A) 66% is not exactly two thirds.
B) the size of the sample is too small.
C) the sample is not representative of the population.
D) there was no control group.
E) None of the above

32) A method of sampling in which the population is broken up into categories and the members of the sample are chosen randomly from within some group of randomly selected categories is called 32) _____
A) stratified sampling.
B) simple random sampling.
C) quota sampling.
D) randomized controlled sampling.
E) None of the above

33) Any type of numerical information about a population obtained from a sample is called 33) _____
A) a controlled study.
B) a statistic.
C) a clinical study.
D) a parameter.
E) None of the above

34) A controlled placebo experiment is said to be blind when 34) _____
A) none of the scientists conducting the experiment know which patients are in the control group and which patients are in the treatment group.
B) the members of the control group are told they are in the treatment group.
C) neither the members of the control group nor the members of the treatment group know to which of the two groups they belong.
D) the members of the treatment group are told they are in the control group.
E) None of the above

35) A controlled placebo experiment is said to be double-blind when 35) _____
A) neither the subject nor the scientists conducting the experiment know which individuals are in the treatment group and which are in the control group.
B) none of the scientists conducting the experiment know which patients are in the control group and which patients are in the treatment group.
C) neither the members of the control group or the members of the treatment group know to which of the two groups they belong.
D) the members of the control group are told they are in the treatment group and vice versa.
E) None of the above

36) Which of the following will most likely make an instant, online poll (such as one found at CNN.com or ESPN.com) unscientific? 36) _____
A) quota sampling
B) leading question bias
C) small sample size
D) voluntary response
E) the placebo effect

37) In 2004, exit polls on the day of the election showed presidential candidate John Kerry ahead of George W. Bush. Later, it was found that those that voted for Bush were less interested in answering exit polls than other voters. This fact illustrates that the 2004 presidential exit polls were flawed because 37) _____
A) of non-response bias.
B) the sampling rate was too small.
C) the sample size was too small.
D) they were not a stratified survey.
E) of sampling variability.

Answer Key
Testname: MATH 225 EXAM3REVIEWPACKET

1) C
2) A
3) B
4) D
5) E
6) C
7) A
8) A
9) A
10) D
11) A
12) C
13) B
14) D
15) C
16) D
17) C
18) B
19) D
20) B
21) D
22) C
23) A
24) A
25) B
26) C
27) D
28) D
29) A
30) B
31) C
32) A
33) B
34) C
35) A
36) D
37) A