Math 2311
TEST 2 REVIEW SHEET

#1 – 25, Define the following:

1. Continuous random variable
2. Discrete random variable
3. Density curve
4. Uniform density curve
5. Normal distribution
6. Sampling distribution (for $\bar{x}$ and $\hat{p}$)
7. Z-score
8. LSRL
9. Correlation coefficient
10. Coefficient of determination
11. Interpretation of slope of the LSRL
12. Residual
13. Sample
14. Population
15. Census
16. Simple random sample
17. Other types of sampling design
18. Experiment
19. Observational study
20. Bias
21. Subjects
22. Treatments
23. Factors
24. Control (three fundamental principles of)
25. Simulation

26. Consider a uniform density curve defined from x = 1 to x = 8.
    a. What is the height of the "curve"?
    b. What percent of observations fall between x=2 and x=5?
    c. What percent of observations fall below x = 4?
    d. What percent of observations fall above x = 6?
    e. What percent of observations equal 7?

27. Let X be a normal random variable with $\mu = 82$ and $\sigma = 4$.
    a. Sketch the distribution
    b. According to the Empirical Rule, the middle 68% of the data falls between what values?
    c. Find $P(X < 83)$
    d. Find $P(X > 79)$
    e. Find $P(73 < X < 84)$
    f. Find x such that $P(X < x) = .97725$

28. Recall Z is the standard normal random variable.
    a. What is the mean and standard deviation for Z?
    b. Sketch the distribution
    c. Find $P(Z < 1.2)$
    d. Find $P(Z < -1.64)$
    e. Find $P(Z > -1.39)$
    f. Find $P(-0.45 < Z < 1.96)$
    g. Find c such that $P(Z < c) = 0.845$
    h. Find c such that $P(Z > c) = 0.845$
    i. Find c such that $P(-c < Z < c) = 0.845$

29. Suppose a sample of 100 subjects was taken and their scores on an exam recorded. If the population mean for the exam is 67 and population variance is 36,
    a. what is the mean and standard error of the sampling distribution, $\overline{X}$?
    b. find $P(\overline{X} < 70)$.
    c. find $P(45 < \overline{X} < 74)$.

30. What is the difference between the distributions for X and $\overline{X}$?

31. The following data indicates the number of hours a swimmer practiced during a week and his best time on the 50 meter free style that week.

Hrs practicing	2.5	4	4.5	6	7	7.5	8.5	9	11
Time/sec	29.33	28.76	28.01	27.96	27.99	27.35	27.02	26.85	26.09

    a. Identify the explanatory and response variables for this situation.
    b. Create a scatterplot
    c. Give the equation for the LSRL and plot the LSRL on the scatterplot
    d. Find the correlation coefficient and the coefficient of determination. What do each of these tell you about the data?
    e. Based on your answers to b and d, is this a good model?
    f. Plot the residuals vs explanatory variables.
    g. Based on your answer to f, do you still think your LSRL is the best model?
    h. Find the residual value that corresponds to the explanatory variable value of 4.

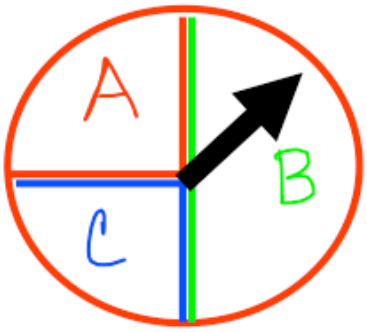
32. 1000 students were asked to give their favorite subject and favorite video game (chosen from a list). The results are recorded in this two-way table:

	Math	Science	English	Social Studies	
Zelda	66	70	40	35	
Final Fantasy	54	75	60	30	
Tomb Raider	35	50	80	90	
Assassin's Creed	45	40	60	100	
None of these	10	5	20	35	

a. Complete the table by filling in the marginal distributions.
b. What is the probability that someone likes Tomb Raider?
c. What percent of math students like Zelda?
d. What percent of people who like Assassin's Creed also like English?
e. What is the probability that someone likes both Science and Final Fantasy?

33. Classify each as a experiment or observational study:
    a. A professor is curious as to what the students on campus eat for lunch. He sits at the UC and watches the students between 11am and 1pm and records his findings.
    b. A radio station wants to know more about its listeners so a representative travels to shopping malls in the listening area to ask people what their favorite radio station is.
    c. A farmer wishes to know if a new feed makes a difference in how his cows behave. He gives half of his cows the new feed while the remaining cows do not change diet. He records the results after two weeks.

34. A game is played with the spinner below. If your spin lands on A, you win $1. If your spin lands on B, you lose $1. If the spinner lands on C, nothing happens. Ten people are playing the game.
    a. Using single digits from the random digit table, describe how you will run a simulation for the 10 players.
    b. Using line 120 from the random digit table, carry out the simulation 3 times.
    c. Based on your simulation, how many people won $1 for each run? How many lost $1?



P(A) = .25
P(B) = .50
P(C) = .25