[MATH 105 FINAL REVIEW]

(important notes)

- The final is in NS 101 on Monday, December 10th , at 12:00 pm.
- The exam is comprehensive, covering chapter 1, 8, 9, and 10, with a heavier focus on chapter 10 (since we didn't have an actual exam over it)
- You can use a 3x5 notecard (front and back) and a calculator on this exam – NO PHONES THOUGH!
- Study old homework problems (you can view solutions from past assignments, but try to redo them on your own paper)
- Study the review sheets and in-class review problems from previous exams (can find links to them on my website)
- It's going to be a pretty standard exam, I'll hit the major concepts of each chapter!

Below are some additional questions you can use to jumpstart your own review .

1. A friend of yours flips 3 coins. You are told at least 1 tails is showing. What is the probability of all tails?

2. You flip three coins. What is the probability of at least one head?

3. You deal three cards, without replacement, from a standard 52 card deck. What is the probability that you get three diamonds?

4. You deal three cards, without replacement, from a standard 52 card deck. What is the probability that you get at least one heart?

5. In a small town lotto game, three numbers are chosen at random from 15 numbers. If the ticket matches the numbers in any order you win.
   a. What is the probability that a ticket is a winner?
   b. Suppose a ticket costs $5. If you match all three numbers you win $5,000. What is the expected value of the game?

6. How many ways are there to choose a president, vice president, and a treasurer for the student council from a group of 10 candidates?

7. How many ways are there to choose a committee of three people from a group of 10 people? (try to see how this is different that question 6 – ask yourself: does order matter?)

8. A survey was conducted to find which iconic game franchise is more popular: Super Mario Brothers or The Legend of Zelda. In a random sample of 250 people, 180 said Super Mario Brothers was more iconic. Find a 95% confidence interval for the proportion of people who find Super Mario Brothers the more iconic game franchise.

9. A survey was conducted to find the proportion of students who felt ready for their final exams. In a random sample of 80 students, 56% said they were ready. Give a 95% confidence interval for the proportion of students who are ready for their final exams.

10. Which is "wider" – a 95% confidence interval or an 85% confidence interval (using same data for both).

11. A 95% confidence interval with a margin of error of ±4% found that 51% of eligible voters would elect Candidate A in the upcoming election. Should Candidate A be confident she is going to win? Explain.

12. (Mindscape 11 from section 1.4) Three strangers, Bob, Mary, and Ivan, meet at a taxi stand and decide to share a cab cut to cut down the cost. Each has a different destination, but all the destinations are on a highway leading from the airport, so no circuitous driving is required. Bob's destination is 10 miles away, Mary's is 20 miles away, and Ivan's is 30 miles away. The taxi costs $1.50 per mile including the tip, regardless of the number of passengers. How much should each person pay? (There is more than one way to think about this, but the answer should be fair in some mathematical way – not just "split the final fare 3 ways".)

13. (Mindscape 7 from section 8.4) A dormitory has an electronic lock. To unlock the door, students must enter their unique five-digit secret code into the keypad (made up of the digits from 0 to 9, each of which can be used more than once). How many different secret codes are there? Suppose there are 200 students living in the dorm. What is the probability of one of them randomly guessing a code and having the door unlock.

14. Suppose you have stack of 10 lottery tickets where 3 are winners and the rest are losing tickets. They are mixed together randomly.
    a. What is the probability that the first ticket is a winner and the second is a losing ticket?
    b. What is the probability that in the top three tickets at least one is a winning ticket?

15. Suppose that the number of calories eaten per day by a college student follows a normal distribution with a mean of 2300 calories and standard deviation 750.

    a. Between what two values for the middle 95% of students eat in calories in a day?

    b. What is the probability that a randomly selected student will eat more than 3050 calories in one day?

    c. Would it be unusual for a student to eat less than 500 calories a day? Explain by finding the z-score of such a student.

16. Each team in a new basketball league will play three games against each of the other teams. There are seven teams: the Blockers, the Ankle Breakers, the Ballers, the Screens, the Pick and Rollers, the Defenders, and the Buzzer Beaters. How many games will be played in all?

17. You want to purchase a Table. You have decided that you will judge the tables based on the following categories: price, stability, aesthetics , and surface area. Each category is worth 10 points where 10 is considered the best score possible. You've also narrowed your selection down to three tables. The following table gives the scores you assigned for each vacuum.

	Price	stability	aesthetics	Surface area
Table 1	5	8	4	9
Table 2	9	4	7	6
Table 3	2	9	9	7

    a. If each category is worth the same (all have equal weights), which table should you buy?

    b. If the price is 50% of the deciding factor, stability is 15%, aesthetics is 15%, and surface area is 20%, which table do you buy?

    c. If price is 25% of the deciding factor, stability is 40%, aesthetics is 10%, and surface area is 25%, then which table do you buy?

18. Construct a data set where 80% of the values are below the average. What is the median of your set?

19. Make a sketch off the graphs with the following shapes: normal, skewed left, bimodal, and uniform.

20. For which graphs in question 19 would you expect a mean of the data to be equal to the median?

21. You conducted a survey and found 65% of people prefer LEGOs over Lincoln Logs with a margin of error ±6% at a 95% confidence level. Based on these results can you predict which childhood toy most people prefer? Explain.

22. Suppose you are the owner of a restaurant and are considering adding ice cream to your dessert menu. You want to survey people to see if they would order it off the menu. How many people should you ask to construct a 95% confidence interval with an error no more than 3%?

23. You play a game where two dice are rolled. If you roll doubles you win $10; if you get an odd sum you pay $2; in all other cases you win $0. Is this a fair game? Explain.

24. You visit a bank planning on investing $2000 into an account with an annual interest rate of 3% but the bank tells you that if you put $4000 into the account, the will increase the rate to 3.5%. How much more money would you make if you took the higher interest rate after 5 years?

25. You want to purchase a $450,000 home. You have $40,000 saved up for a down payment.
    a. If you get a 15 year mortgage with an annual interest rate of 3.5%, how much will your monthly payments be? In the end, how much money will you spend on the purchase of your home?
    b. If you get a 30 year mortgage with an annual interest rate of 4.3%, how much will you monthly payments be? IN the end, how much money will you spend on your home?

26. Roughly 14.3% of men have prostate cancer. For decades the PSA blood test has been the primary source of detection of early stage prostate cancer where a high PSA level is a potential indicator of prostate cancer. Additionally, the PSA blood test has a false positive rate of 75% and is accurate in detecting prostate cancer in men that actually have prostate cancer 85% of the time. If a man has a high PSA level, what are the chances he has prostate cancer?