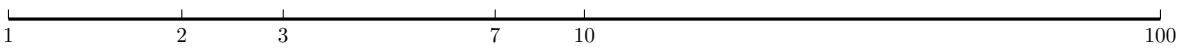
Math 111 - Midterm 2 Review Problems

Most of these problems do not need a calculator. Remember, you will not be allowed to use a calculator on the test.

1. Express the number $0.\overline{739}$ as a fraction of two whole numbers.
2. $\sqrt{2} = 1.41421356237309504880...$ Does the decimal expression for $\sqrt{2}$ ever start repeating? Explain why or why not.
3. Convert the following numbers to scientific notation.
   (a) 5,800,000
   (b) 0.0073
   (c) 3/20
4. What is 2.0×10^7 times 3.1×10^{-3}?
5. What is $\dfrac{6.0 \times 10^8}{2.0 \times 10^3}$?
6. List the first 8 Fibonacci numbers.
7. If $F_{20} = 6765$ and $F_{21} = 10946$, then what is F_{22}?
8. Explain what the two expressions below represent in words. In particular, explain the difference between the expressions in part (a) and (b).
   (a) $F_N + 1$
   (b) F_{N+1}
9. The golden ratio is the positive number φ with the property that $\varphi + 1$ is the same as φ^2. Use the quadratic formula $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to find φ.
10. Write down the first 5 rows of Pascal's triangle.
11. Use the binomial theorem to expand $(x + 10)^4$.
12. Suppose you are selecting a lunch at a restaurant. You may select either a soup and salad combination or a sandwich. If there are 3 soups, 4 salads, and 8 sandwiches available, how many different lunch combinations are possible?
13. What is the probability of flipping a coin 4 times and getting 3 or more heads?
14. (a) A basketball coach has 12 players on his team. How many ways can the coach choose 5 starters for the next game?
    (b) A baseball coach has to choose the batting order for the 9 players on his team. How many ways can he do this?

15. A box contains a red ball, a blue ball, and a green ball. A ball is drawn at random and then replaced. A second ball is then drawn at random.
    (a) Show all the possible outcomes using a tree diagram.
    (b) What is the probability that you draw a red ball both times?
    (c) Calculate the probability of getting one blue and one red ball.

16. Use the numbers shown and a ruler to mark the correct positions of the numbers 5, 35, 70, and $\frac{10}{7}$ on the rule of proportion below.



17. A bank offers a savings account with a fixed 3.6% annual rate, compounded monthly. If you invest \$1000 for 5 years? Write down the formula for how much money you will have after 5 years.

18. Find the following without a calculator.
    (a) ${}_5C_4$
    (b) ${}_5P_4$
    (c) ${}_{50}C_{48}$

19. A die is rolled and a coin is tossed. Find each probability.
    (a) The die shows a 2 and the coin shows a tail.
    (b) The die shows a 4 or 5 and the coin shows heads.

20. The scoring for a college course is given in the following table.

	Exam 1	Exam 2	Exam 3	In-Class	Paper	Final Exam
Weight	15%	15%	15%	10%	25%	20%
Bob's scores	77	83	91	90	87	?

    What grade would Bob need on the final exam to get an 83 in the course?

21. Find the expected value of a random variable with four possible outcomes and probabilities shown below.

Outcome	-1	0	4	10
Probability	0.1	0.25	0.25	?

22. Find 5 positive numbers with mean 8, median 9, and mode 12.

23. A class of history students received the following quiz scores. Draw a histogram for the data below.

Score	0	1	2	3	4	5	6	7	8	9	10
Frequency	0	0	2	0	0	3	2	3	5	2	3