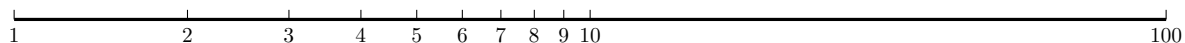


## Math 111 - Midterm 2 Review Problems

Here are some review problems for the first midterm. Two thirds of the exam will be based on problems just like these. The rest will be similar to the problems from the workshops and homework.

1. Indicate where the numbers 25, 48, and  $70/3$  belong on the logarithmic scale below.



2. Why are logarithmic scales sometimes a misleading way to present data?
3. A car gets 30 miles per gallon on the highway. Gas costs \$3.50 per gallon. It is 65 miles from Farmville to Richmond, VA. Use factor label method to write down an expression for the cost in dollars of a trip from Farmville to Richmond.
4. Convert the following growth factors into percentage changes. Be sure to indicate if it is a percentage increase or decrease.
  - (a) Quadruple
  - (b) 1.3
  - (c) 0.4
  - (d) 2.7
5. In mathematics, we use the word “factor” to refer to what kind of number?
6. Suppose that you put \$1200 in a savings account that pays 2% APR compounded monthly. Write down a formula for how much money you will have in that account after 10 years. You do not need to simplify your answer.
7. Suppose that my investment portfolio grows 10% one year, and then declines 10% the next year. Calculate the total percentage change in my investments (without a calculator).
8. Convert the following percentage changes into growth factors.
  - (a) 250% increase
  - (b) 15% increase
  - (c) 15% decrease
9. Use the following preference schedule to answer the questions below.

Class President Preferences			
Number of voters	11	10	7
1st choice	Alice	Bob	Carmen
2nd choice	Carmen	Carmen	Bob
3rd choice	Bob	Alice	Alice

- (a) How many people prefer Bob as their second choice?
  - (b) In a head to head competition between Alice and Bob, who would get more votes?
  - (c) Is there a Condorcet candidate? Explain.
  - (d) Who would win the election using the Borda count method?
  - (e) Which candidate would be the first person eliminated in Instant Run-Off Voting?
10. Which of the following methods always elects a Majority Candidate?
- (a) Plurality
  - (b) Instant Run-Off
  - (c) Borda Count
  - (d) Approval Voting
11. What is a Condorcet candidate?
12. Explain why income taxes in the United States are a progressive tax.