MA 111 Review for Exam 2

Exam 2 (given in class on Tuesday, March 2) will cover numbers and quantities, percent and percent change, mean and median, and the introduction to indices.

Can you work each homework, worksheet, and quiz problem *correctly* and *quickly*, providing explanations and justifications, without looking at the text or your notes?

Have you carefully studied the material in the text?

You should be familiar with the following key ideas:

- Understand the difference between number and quantity.
- Know how to convert units (e.g., miles/hour to feet/sec).
- Know how to compare quantities with ratios and with percents.
- Know how to understand, or make better sense, of very large or very small quantities.
- Understand the importance of correct units.
- Understand what percent means.
- Know what the base of a percent is, and be able to identify the base of a percent in context.
- Be able to find different variables in a percentage calculation (e.g., use the base and the result to find the percent).
- Understand how changes in numbers can be measured by percents (percent change).
- Know how to increase or decrease a number by a percentage, and how to reverse this process.
- Understand the difference between (1) change, (2) percent change, (3) change in percent (percentage points), and (4) percent change of percent.
- Understand the difference between mean and median, and know how to compute them and to solve problems involving these quantities.
- Be able to create an index from a collection of data, to figure out the index values from data values, and to figure out data values from index values.
- Be able to interpret a short passage and analyze the given information about numbers, quantities, percents, percent change, means, medians, and indices.

Practice Problems

1. Review the practice problems for Exam #1, and also the problems from Exam #1 itself.

2. A data set of 10 numbers has mean 40. What is their sum?

   mean $= \frac{\text{sum}}{N}$. Here, $N = 10$ and the mean $= 40$. So the sum $= 40 \times 10 = 400$.

3. A data set of 8 numbers has mean 50. The data set is enlarged by introducing a 9th number, 14. What is the new mean?

   Let S be the sum of the original eight numbers. Then, as in the previous problem, $S = 50 \times 8 = 400$. With the ninth number, the sum enlarges to $400 + 14 = 414$, so the new mean is $\frac{414}{9} = 46$.

4. A data set of 5 numbers has mean 88. What is the smallest value of a sixth number that can be introduced into the data set to raise the mean to 90?

   Let S be the sum of the original five numbers. Then $S = 88 \times 5 = 440$. Let x be the value of the sixth number. Then the new mean is $\frac{S+x}{6} = \frac{440+x}{6}$. Set this equal to 90 and solve for x, getting $440 + x = 90 \times 6 = 540$, so $x = 100$.

5. A data set of 11 numbers has median 12. How many numbers in the data set are less than 12? How many numbers in the data set are less than or equal to 12? How do your answers change if you know that all of the numbers in the data set are different?

   There is no guarantee that any numbers are less than 12, but you can say that at least 6 numbers are less than or equal to 12. If all of the numbers are different, you now know that 5 numbers are less than 12 and 6 numbers are less than or equal to 12.

6. Ask a friend to give you two different numbers a and b. Construct a data set with mean a and median b. With mean b and median a.

   There are lots of ways to do this, but I suggest first selecting one number x in the data set to equal the median, then a second number y below it and a third number z above it. Then decrease y or increase z until you get the mean that you want.

7. Below is a partial table of an index for the cost of a gallon of fuel oil. Fill in the missing numbers.

Year	Cost of gallon of oil	Cost-of-Oil Index
2006	2.418	
2007		18.88
2008		26.60
2009	2.509	20.00
2010	2.967	

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2006	2.418	19.27
2007	2.368	18.88
2008	3.337	26.60
2009	2.509	20.00
2010	2.967	23.65