MTH 23.5 LECTURE NOTES (Ojakian)

Topic 4: Percentiles, Quartiles, and Numbers

OUTLINE

References (**Algebra Book**: page 9; **Statistics Book**: 2.3, 2.4)

1. Simplifying Fractions
2. Percentiles and Quartiles

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1. Pie Charts and Numbers
   (a) Opening Example: PBS Pie Charts
   (b) Example: Make Pie Chart from some class data
   (c) Three ways to represent numbers: Fractions, decimals, percents.
   (d) Understand various fractions with Pie Charts
      i. Express 1/2 or 25%, etc..
      ii. What about 100% or even more than that?
2. Number Line

   PROBLEM 1. *Draw the number line and place the following numbers on it (largest, smallest?):*

   $$0,\ 4,\ -5,\ -8,\ 1/2,\ -1/2,\ 11.75,\ -7.75,\ 11,\ 75\%,\ 100\%,\ \frac{1}{3},\ -3\frac{3}{4}$$

3. Simplifying Fractions
   (a) The Fundamental Principle of Fractions
      i. $\frac{a}{b} = \frac{ac}{bc}$ (multiply top and bottom by same number)
      ii. $\frac{a}{b} = \frac{a \div c}{b \div c}$ (divide top and bottom by same number)

      PROBLEM 2. *Write each fraction as two different, but equivalent fractions:* 2/4, 7/3, −1/4, 5.
   (b) Simplified Fraction (or Reduced Fraction)

      Definition 1. *A fraction a/b is **simplified** if there is no whole number larger than 1 divides evenly into both a and b.*

      PROBLEM 3. *Simplify the fractions:* 28/36, 3/13
4. Converting between fractions, decimals, or percents
   (a) Convert: Percent → Decimal (just divide by 100)
   (b) Convert: Decimal → Percent (just multiple by 100)
   (c) Convert: Fraction → Decimal (just divide)

(d) Convert: Decimal or Percent → Fraction

i. Write as "(decimal)/1"

ii. Multiply top/bottom by appropriate power of 10 (so decimal point is gone)

iii. Then simplify

(e)

PROBLEM 4. *Look at our class stats and find the fractions of students in various categories. Convert the fraction to a decimal and to a percent.*

(f)

PROBLEM 5. *Suppose* 65% *of your neighborhood has an iphone. What fraction of the people have an iphone?*

PROBLEM 6. *Convert the decimal* 2.8 *to a fraction.*

5. Quartiles

How is the data spread out?

Do with Example of Figure 2.1 in section 2.4

(a) Range of data = max - min.

(b) Second Quartile = Median

(c) First Quartile = Median of lower half of data.

(d) Third Quartile = Median of upper half of data.

(e) Interquartile range = Quartile Three - Quartile One

(f) Box and Whisker Plot: Picture of data spread

i. Draw, noting quartiles

ii. Note Interquartile Range

6. Percentile

Note: Always chose a percentile between 0 and 100, exclusive!

(a) Openning Example: Section 2.3 - Example 2.15 (table of cumulative frequencey

(b) Formula for the position(s) of the k^{th} percentile:

i. position $= \frac{k}{100}(n+1)$

ii. k^{th} percentile = data value at that postion.

iii. Detail: if the position is not an integer take the mean of the two data values (one before, and one after)

(c) Section 2.3 - Try it - 2.15

(d) Section 2.3 - Example 2.16

(e) Put quartile language in terms of percentiles.

(f) Example: Make up some test score percentages, choose a curve based on percentiles, and find some grades.

(g) Examples: 2.3 (page 128ff): 26, 27, 28.