MATH 1 –   Handout for Chapter 6

Chapter 6 deals with **R** the Real number system. Recall as you read 6.1 the sets

- **N** = { 1, 2, 3, ... } = the set of natural numbers

  N ∪ {0} = { 0, 1, 2, 3, ...} = the set of whole numbers

  Z = { ...... $-3, -2, -1, 0, 1, 2, 3, ...$ } = the set of integers

  Q = the set of rational numbers = $\{(p/q) \mid p, q \in \mathbf{Z},\ q \neq 0\}$

  I = the set of irrational numbers = **R** − **Q** = $\{x \mid x$ is a real number which cannot be written as a quotient of two integers with nonzero denominator }

  R = the set of real numbers = $\{x | x$ is a number that can be written as a (possibly infinite) decimal}

  Note that **I** ⊂ **R** and **Q** ⊂ **R**, **Q** and **I** are disjoint since **Q** ∩ **I** = ∅.

- The sets **N , Z , Q , I , R** are all examples of infinite sets.
  Go over p. 224 carefully. Try problems 11 and 12 from **6.1** Exercises.

- Read all the historical and interesting notes on the margins. The additive inverses, the Double negative rule, and the formal Definition and properties of Absolute value $|x|$ are important.

- Order < , ≤ , > , ≥ is explained on p.225.
  HW 6.1: Odd numbered exercises 1 to 74.

- 6.2 treats Order of Operations ("Please Excuse My Dear Aunt Sally" , p.234), addition, subtraction, multiplication and division, and their

properties (p.234-237). Go over the table of Properties of Addition and Multiplication on p.236.

HW 6.2: 1,2,3,4, Odd numbered exercises from 7 to 59, 69 to 76, 81, 83, 87, 89, 91, 95.

- In 6.3 we study the rational numbers further. Expressing in lowest form, Fundamental property of rationals, Cross-Product test for Equality, Addition and multiplication among the rational numbers $(\mathbf{Q}, +, .)$, Subtraction and division in $\mathbf{Q}$, the density property of $\mathbf{Q}$, McKay's Theorem (p. 253-254 problems $67-73$), and the decimal representation of rational numbers with criteria for terminating and repeating decimals (p. 248) are all discussed with many examples.

  HW for 6.3: ODD NUMBERED EXERCISES from 1 to 12, from 19 to 36, from 39 to 48, and odd numbered exercises from 67 to 101.

- 6.4 deals with Irrational numbers, Irrationality of $\sqrt{2}$ using *Proof by Contradiction*, the decimal representation criteria for irrationals (neither terminating nor repeating), π, e, Product rule for $\sqrt{}$, simplified form of a radical (p.257), and the quotient rule for $\sqrt{}$, and the irrational numbers π, ϕ, and e.

  HW for 6.4: Odd numbered exercises from 1 to 43, 71 to 90.

- A brief survey of 6.5 ON YOUR OWN shows applications of decimals and percents, how to deal with decimals, and the basic arithmetic operations on decimals. Pay attention to the Rules for Rounding Decimals (p. 266), converting decimals to percents and *vice versa*, converting a fraction to a percent, and finding Percent increase or decrease (p.270).

  HW for 6.5: 1 to 10, 25 to 28, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 53, 55, 57, 63-72, 73, 79, 83, 87, 91, 92.