Chapter 1 Homework

1.1 #1-137 odd

1.2 #97-113 odd

1.3 #30-57 odd; 97-105 odd; and study properties!

1.4 #1-31 odd

Given the following sets, determine the unions and intersections:

$A = \{1,2,3,4,5\}$, $B = \{1,3,5\}$, $C = \{2,4,6\}$

6. $A \cap C =$ $\{2,4\}$

7. $A \cup B =$ A

8. $B \cap C =$ $\emptyset$

9. $A \cap B =$ B

10. $A \cup C =$ $\{1,2,3,4,5,6\} = A \cup \{6\}$

natural #'s? $\mathbb{N}$ integers? $\mathbb{Z}$

real #'s? $\mathbb{R}$

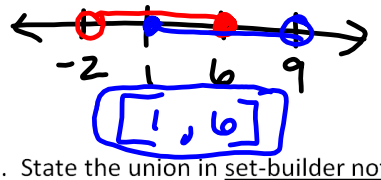
rational #'s? $\mathbb{Q}$

irrational #'s? $\mathbb{R} - \mathbb{Q}$

prime/composite #'s?

11. State the intersection in interval notation:

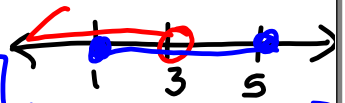
$\{x|-2 < x \leq 6\} \cap \{x|1 \leq x < 9\}$



$[1,6]$

12. State the union in set-builder notation:

$(-\infty, 3) \cup [1,5]$



$(-\infty, 5]$

$\{x \mid x \leq 5\}$

An identity element is the number that we can apply to any other number that leaves it unchanged.

Additive Identity

the number that we can add to any other number that leaves it unchanged

0

$0 + x = x = x + 0$ for all $x \in \mathbb{R}$

An inverse element is the number that we can apply to an element that results in the identity element.

Additive Inverse of x

the number that we can add to an element that results in the identity element $-x$

$-x + x = 0 = x + (-x)$ for all $x \in \mathbb{R}$

Multiplicative Identity

1

$1 \cdot x = x = x \cdot 1$ for all $x \in \mathbb{R}$

Multiplicative Inverse of x

$\frac{1}{x}$, $x \neq 0$

$x \cdot \frac{1}{x} = 1 = x \cdot \frac{1}{x}$ for all $x \in \mathbb{R}$ such that $x \neq 0$

Properties of Addition and Multiplication

1. Commutativity

addition: $a+b=b+a$

multiplication: $ab=ba$

2. Associativity

addition: $(a+b)+c=a+(b+c)$

multiplication: $(ab)c=a(bc)$

3. Distributive Property of multiplication over addition

$a(b+c)=ab+ac$

Order of Operations

P	E	M	D	A	S
Please	Excuse	My	Dear	Aunt	Sally
parentheses	exponentiation	multiplication	division	addition	subtraction

$5+2(3-4)-6(1*3)=$ -15

$5+2(-1)-6(3)$

$5+(-2)+(-18)=-15$

1.2 Operations on Rational Numbers

34. $-9-|-7-(-15)|$

$=-9-|-7+15|$

$=-9-|8|=-9-8=-17$

110. $\left(-\frac{3}{5}\right)^2-\frac{\cancel{3}^{1}}{\cancel{5}}\cdot\frac{\cancel{5}}{\cancel{9}}+\frac{7}{10}$

$=\frac{9}{25}-\frac{1}{3}+\frac{7}{10}=\frac{9}{25}\cdot\frac{6}{6}-\frac{1}{3}\cdot\frac{50}{50}+\frac{7}{10}\cdot\frac{15}{15}$

$5\cdot5 \quad 3 \quad 2\cdot5$

$=\frac{54}{150}-\frac{50}{150}+\frac{105}{150}$

$=\frac{109}{150}$

1.3 Variable Expressions

$a(b+c)=ab+ac$

$a-b=a+(-b)$

98. $5(3a-2b)-3(-6a+5b)$

$15a-10b+18a-15b$

$33a-25b$

100. $3x-2[y-2(x+3[2x+3y])]$

$3x-2[y-2(x+6x+9y)]$

$3x-2[y-2(7x+9y)]$

$3x-2[y-14x-18y]$

$3x-2[-17y-14x]$

$3x+34y+28x$

$31x+34y$

$3(4-5(6)$

$3\cdot 4-3\cdot 5\cdot 3$

$3\cdot 4-35\cdot 6$

1.4 Verbal Expressions and Variable Expressions

Translate into a variable expression and simplify: "The sum of half of a number and 6 less than twice that number."

$+$ $\frac{1}{2}\cdot$ x -6 $2x$

$\frac{1}{2}x+(2x-6)$

$=\frac{5}{2}x-6$

The sum of two numbers is 20. Using x to represent the smaller number, translate "the difference between five times the larger number and three less than the smaller number."

$20-x$ x

$5(20-x)-(x-3)$