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

Chapter 2 Homework

2.1 #39-77 odd

2.2 #7-27 odd

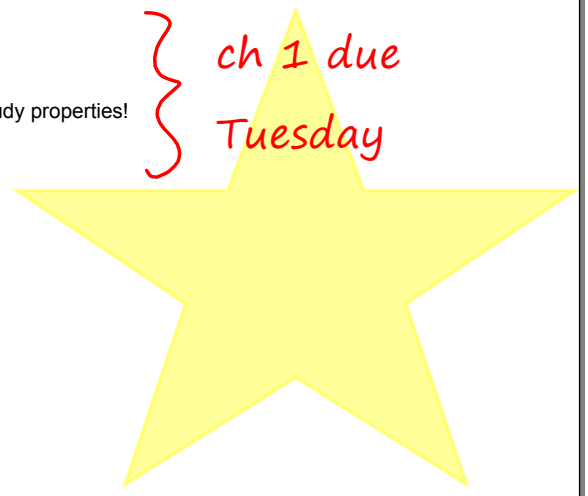
2.3 #7-25 odd

2.4 #5,7,11,17,19,23,27

2.5 #35-71 odd

2.6 #33-69 odd

ch 1 due Tuesday



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. $B \cap C =$ ∅

9. $A \cap B =$ B

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

Identify by definition & special symbol:

Natural Numbers ℕ

Integers ℤ

Real Numbers ℝ

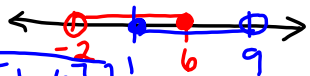
Rational Numbers ℚ

Irrational Numbers ℝ − ℚ

Prime & Composite Numbers

11. State the intersection in interval notation:

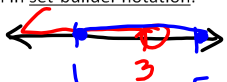
$\{x|-2 < x \leq 6\} \cap \{x|1 \leq x < 9\}$



[1, 6]

12. State the union in set-builder notation:

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



$(-\infty, 5]$

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

16. Rewrite the set in *interval notation*: $\{x|x \geq 5\}$

$[5, \infty)$

17. Rewrite the set in *set-builder notation*: $(-4,2]$

$\{x \mid -4 < x \leq 2\}$

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

Additive Identity 0

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

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

"$\in$" in the set of

"that are elements of"

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

Additive Inverse of x $-x$

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

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

Multiplicative Identity 1 "for all"

$x \cdot 1 = x = 1 \cdot x \quad \forall x \in \mathbb{R}$

Multiplicative Inverse of x $\frac{1}{x}$ (reciprocal)

$2 \cdot \boxed{\frac{1}{2}} = 1$

$\frac{1}{x} \cdot x = 1 = x \cdot \frac{1}{x} \quad \forall x \in \mathbb{R}, x \neq 0$

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: $(ab) \cdot c = a \cdot (bc)$

3. Distributive Property of multiplication over addition

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

$\forall a,b,c \in \mathbb{R}$

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)=

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

$= 5+(-2)-18 = \boxed{-15}$

1.2 Operations on Rational Numbers

34. $-9-|-7-(-15)|$ $= -9-|8| = -9-8 = \boxed{-17}$

110. $\left(-\frac{3}{5}\right)^2 - \frac{3}{5}\cdot\frac{5}{9}+\frac{7}{10}$ $= \frac{9}{25} - \frac{\cancel{3}^{1}}{\cancel{5}}\cdot\frac{\cancel{5}}{\cancel{9}_{3}} + \frac{7}{10}$

$= \frac{9}{25} - \frac{1}{3} + \frac{7}{10}$

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

$LCD = 2\cdot3\cdot5\cdot5 = 150$

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

$= \frac{54}{150} - \frac{50}{150} + \frac{105}{150} = \boxed{\frac{109}{150}}$

1.3 Variable Expressions

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

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

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

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

$= \boxed{33a-25b}$

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

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

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

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

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

$= 3x+34y+28x$

$= \boxed{31x+34y}$

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."

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

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."

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

Properties of Equality

1. Reflexivity

$x = x$

2. Symmetry

If $a = b$, then $b = a$

3. Transitivity

If $a=b$ and $b=c$, then $a=c$.

4. Substitution - if two things (numbers, expressions, etc.) are equal to each other, then they can be substituted for each other in any expression.

2.1 Equations in One Variable

- An equation that is true for only some instances of the variable is called a **conditional equation**. $2x-3=5$
- An equation that is never true for any instances of the variable is called a **contradiction**. $2x-3=2x+5 \Rightarrow -3=5$
- An equation that is always true for any instance of the variable is called an **identity**. $2x-3=5x-3x+4-7 \Rightarrow -3=-3$
- One way to simplify an equation involving fractions is to get rid of the fractions by: multiplying both sides by the least common denominator.
- The solution set to a contradictory equation is the empty set.
- The solution set to an identity is all real numbers.

$\frac{1}{2}x-\frac{1}{3}=\frac{5}{4}$

$12\left(\frac{1}{2}x-\frac{1}{3}\right)=\frac{5}{4}\cdot 12$

$6x-4=15$

$\frac{1}{2}x-\frac{1}{3}=\frac{5}{6}$

$6\left(\frac{1}{2}x-\frac{1}{3}\right)=6\cdot\left(\frac{5}{6}\right)$

$3x-2=5$

40. $7 + 8y - 12 = 3y - 8 + 5y$

$-5 + 8y = 8y - 8$

$-5 = -8$

$\emptyset$

66. $\frac{2}{3}x - \frac{5}{6}x - 3 = \frac{1}{2}x - 5$

$6\left(\frac{2}{3}x - \frac{5}{6}x - 3\right) = 6\left(\frac{1}{2}x - 5\right)$

$4x - 5x - 18 = 3x - 30$

$-x - 18 = 3x - 30$

$-18 + 30 = 3x + x$

$12 = 4x$

$x = 3$

92. $\frac{6}{\left(\frac{7}{a}\right)} = -18$

$a \cdot 6 = \frac{-18}{1} \cdot \frac{7}{a} \cdot a$

$\frac{6}{\frac{7}{a}} \cdot \frac{7}{a} = -18 \cdot \frac{7}{a}$

$\frac{6a}{6} = \frac{-18 \cdot 7}{6}$

96. $\frac{4(x-5) - (x+1)}{3} = x - 7$

$a = -21$

2.2-2.4 - Linear Equation Word Problems

2.2 - Coin, Stamp, and Integer Problems

4. A collection of 22 coins has a value of $4.45. The collection contains dimes and quarters. Find the number of quarters in the collection.

Type of coin	# of coins	Value per coin	Total value
Dimes	$22-x$	0.10	$(22-x)(0.10)$
Quarters	x	0.25	$(x)(0.25)$

$0.1(22-x)+0.25x=4.45$

$2.2-0.1x+0.25x=4.45$

$100 \cdot 0.15x=2.25 \cdot 100$

$15x=225$

$x=$ 15 quarters

14. A stamp collection consists of 3¢, 12¢, and 15¢ stamps. The number of 3¢ stamps is five times the number of 12¢ stamps. The number of 15¢ stamps is four less than the number of 12¢ stamps. The total value of the stamps in the collection is $3.18. Find the number of 15¢ stamps in the collection.

Type of stamp	# of stamps	Value per stamp	Total value
3¢	$5x$	0.03	$0.03(5x)$
12¢	x	0.12	$0.12(x)$
15¢	$x-4$	0.15	$0.15(x-4)$

$0.03(5x)+0.12x+0.15(x-4)=3.18$

$0.15x+0.12x+0.15x-0.6=3.18$

$0.42x=3.18+0.6$

$100. \quad 0.42x=3.78 \cdot 100$

$42x=378$

$x=\frac{378}{42}$ 9 $-4=$ 5 15¢ stamps

20. One integer is four more than another integer. The sum of the integers is twenty-six. Find the integers.

$x + (x-4) = 26$

$2x = 30$

$x = 15, 11$

22. The sum of three numbers is forty-two. The second number is twice the first number, and the third number is three less than the second number. Find the three numbers.

$x + 2x + 2x - 3 = 42$

$5x = 45$

$x = 9, 18, 15$

28. Find three consecutive even integers such that four times the sum of the first and third integers is twenty less than six times the middle integer.

$x, x+2, x+4$

$4(x + x+4) = 6(x+2) - 20$

$4(2x+4) = 6x+12-20$

$8x+16 = 6x-8$

$2x = -24$

$x = -12$

$-12, -10, -8$