Concepts on Test #3 – M311 Sp 12

Solving Algebraic Equations

- Addition property
  - ✓ Integers & Whole #'s
  - ✓ Fractions & Decimals

Ex 1: Solve each of the following and check your solution

a) $273 + x = 908$ b) $-36 = x + 2$ c) $x - 4 = -2$

d) $\frac{1}{5} + x = \frac{7}{15}$ d) $27.3 + x = 87$ e) $2\frac{1}{3} + x = 7\frac{3}{4}$

- Multiplication property
  - ✓ Whole #'s
  - ✓ Fractions & Decimals

Ex 2: Solve each of the following and check your solution

a) $27x = 483$ (answer as a fraction)   b) $12x = 26.8$

c) $2\frac{1}{3}x = \frac{5}{6}$ (use fractions to solve & answer as a fraction/mixed #/whole number)

- Opposites & Absolute Values
  - ✓ Individual
  - ✓ Together
  - ✓ Comparison ($<$, $>$, $=$)

Ex 3: Evaluate each of the following

a) $-(-(-\frac{2}{3}))$ b) $|-2.57|$ c) $-|-5\frac{1}{3}|$ d) $-|-(-2,850)|$

Ex 4: First give simplify to 2 numbers. Then compare using $<$, $>$ or $=$.

a) $-(-5)$ _____ $-|-5|$ b) $-(-\frac{2}{5})$ _____ $-(-\frac{3}{7})$

c) $-(-|-3.8|)$ _____ $-(-3.08)$

Radicals

- Square roots
  - ✓ Integers, Whole #'s, Fractions, Decimals
  - ✓ The Opposite of a Radical: $-\sqrt{a} = -($answer to $\sqrt{a}$ $)$
    Ex. $-\sqrt{16} = -4$
  - ✓ No negatives under radical ==> No Real Solution
    Ex. $\sqrt{-a}$ = No Real Solution   eg $\sqrt{-4} \neq -2$
    * Because there is no number that when multiplied by itself will equal a negative number.

Ex 5: Find the root. If the root doesn't exist write, "No Real Solution"

a) $\sqrt{169}$ b) $\sqrt{-12}$ c) $\sqrt{\frac{144}{196}}$ d) $\sqrt{0.0016}$

- Cube roots
  - ✓ Integers, Whole #'s, Fractions, Decimals
  - ✓ Negatives are OK under radical ==> Negative Solution

Ex 6: Find the cube root.

a) $\sqrt[3]{64}$ b) $\sqrt[3]{\frac{8}{27}}$ c) $\sqrt[3]{-125}$ d) $\sqrt[3]{0.008}$

Undefined Statements

- Division by Zero $\frac{a}{0}$, $0\overline{)a}$, $a \div 0 =$ UNDEFINED $a \neq 0$

Statement Equaling Zero

- Zero divided by anything $\frac{0}{a}$, $a\overline{)0}$, $0 \div a =$ ZERO $a \neq 0$
  - ✓ Really just multiplication property of zero
    Recall: Division is multiply by a reciprocal so, $\frac{0}{a} = 0 \cdot \frac{1}{a}$

Order of Operations

- PEMDAS (or GEMDAS)
  - ✓ Don't forget to multiply & divide as you come across in left to right order
  - ✓ Don't forget that radicals and absolute values are special parentheses
    Ex. $|-2 - 2| = |-2 + -2| = |-(2 + 2)| = |-4| = 4$ & $\sqrt{2 + 2} = \sqrt{4} = 2$

Ex 7: Simplify using strict order of operations (no distributive property)

a) $8 - 2^3 \div 4$

b) $24 \div 6 \bullet 2 + 2$

c) $2 \bullet 8 - 2^3 \div 4 + 2(13 - 10 + 5)$

d) $\dfrac{{}^2/_3 \bullet \sqrt{(-3 + 3)}}{4 \div 2 + (10 - 13)}$

e) $\dfrac{24 \div 6 \bullet (\sqrt{4}) + 2}{9^2 - 81}$

Adding & Subtracting Integers

- Like signs
  - ✓ Add #'s & keep common sign   Ex. $-5 + -2 = -(5 + 2) = -7$
- Unlike signs
  - ✓ Subtract Big – Small & keep sign of Big   Ex. $-5 + 2 = -(5 - 2) = -3$

Ex 8: Add the following. Show your work as in class with math notation, writing the process in words or on a number line.

a) $-275 + 69$

b) $-2,754 + 3,000$

c) $-157 + -46$

d) $485 + -33$

e) $789 + -1,708$

f) $-501 + 501$

- Changing subtraction to addition
  - ✓ Copy first number, write a plus, write down the opposite of the 2nd #
  - ✓ Next follow the "rules" for addition

Ex 9: Change each subtraction problem to an addition problem. **Do not add**.

a) $275 - 1600$ b) $-38 - 475$ c) $-27 - (-389)$ d) $789 - (-762)$

Formulas & Word Problems

- Perimeter, Area & Volume w/ correct units (units, units² & units³ respectively; match w/ problem)
  - ✓ Squares: $P = 4s$, $A = s^2$, $V = s^3$ (cube)
  - ✓ Rectangles: $P = 2l + 2w$, $A = l \bullet w$, $V = l \bullet w \bullet h$ (rectangular solid)
  - ✓ Circles: $C = 2\pi r = \pi d$, $A = \pi r^2$, $V = {}^4/_3 \pi r^3$ (sphere)
    - o **Note:** Be able to use $\pi \approx 3.14$ or ${}^{22}/_7$ as directed
  - ✓ Right Cylinders: $V = \pi r^2 h$

Ex 10: The volume of air in a room that is a rectangular solid is 1440 ft³. If the room has 8 foot high ceilings and one side of the room is 15 feet long, how long is the other side? Show setup, form an algebraic equation using a missing factor setup and solve the problem to find the length of the unknown side.

Ex 11: A water tower is a right circular cylinder. The tower is 66 feet tall and 22 feet across. Find the volume of water that this water tower will hold. Write the formula, show the information you will use and plug it into the appropriate formula, but you don't have to simplify to get a single number. Use the decimal approximation for pi to the nearest hundredth.

Ex 12: A room is 20 feet by 15 feet. Calculate the amount of carpet needed to cover the floor of this room. Calculate the amount of material needed to put baseboards around the room. (A baseboard is the wood/plastic that goes all the way around a room where the wall meets the floor.)