Math 115
Spring 2017
Lecture 1

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office hrs M-Th 8:50-9:10 in this classroom

T_Th 12:00-1:00 in E5-111Q

Fridays 2:30-5:30 " "

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Order of operations:

① Do inside of groups: ( ), [ ], { }, | |, $\sqrt{\ }$, $\frac{\ }{\ }$

② Do exponents and roots

③ Do Multiplication & Division from Left to right.

④ Do Addition & Subtraction from Left to right.

Simplify

1) $2^3 - \sqrt{64} = 8 - 8 = \boxed{0}$ Do not use $\emptyset$ for zero.

2) $\frac{5^2 - 4^2}{|-3| - \sqrt{9}} = \frac{25 - 16}{3 - 3} = \frac{9}{0}$ undefined $\emptyset$

3) $-2\left(3 - \sqrt{6^2 + (-8)^2}\right)$

$= -2\left(3 - \sqrt{36 + 64}\right)$

$= -2\left(3 - \sqrt{100}\right) = -2(3 - 10) = -2(-7)$

$= \boxed{14}$

3 + (−10)

4) $(-8-\sqrt{4})^2 \div (\sqrt{25} \cdot |-4|)$

$= (-8-2)^2 \div (5 \cdot 4)$

$-8+(-2)$

$= (-10)^2 \div 20$

$= 100 \div 20 = \boxed{5}$

5) $\dfrac{\sqrt[3]{8} - 2^3}{4\cdot(-9) - 6(-5)} = \dfrac{2-8}{-36+30}$

$2\cdot 2\cdot 2 = 8$

$\sqrt[3]{8} = ?$

$?^3 = 8$

$2+(-8)$

$= \dfrac{-6}{-6} = \boxed{1}$

$\dfrac{x}{x} = 1 \; ; x \neq 0$

6) $\dfrac{-8(7-\sqrt{49})}{\sqrt{(-10)^2-(-6)^2}} = \dfrac{-8(7-7)}{\sqrt{100-36}}$

$= \dfrac{-8(0)}{\sqrt{64}} = \dfrac{0}{8} = \boxed{0}$

7) $\dfrac{4^3 - 8^2}{9^2 - (-3)^4}$

$= \dfrac{64-64}{81-81}$

$= \dfrac{0}{0}$ → Indeterminate

It is not Zero, It is not undefined.

Do not use ϕ for Zero.

Expression: Combination of numbers, operations, and letters (Variables)

$3x-10$, a^2+b^2, $(x-y)^2$, $-2x^2+5x-8$

$\frac{x+8}{x-2}$, $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

We simplify or evaluate expressions.

Evaluate $3x-10$ for $x=-2$.

$= 3(-2) - 10$

$= -6 - 10$

$= -6 + (-10) = \boxed{-16}$

Evaluate $-2x^2+5x-1$ for $x=-3$

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

$= -2 \cdot 9 + 5(-3) - 1$

$= -18 + (-15) + (-1) = \boxed{-34}$

Evaluate $\sqrt{b^2-4ac}$ for $a=-9$, $b=6$, $c=-1$

$= \sqrt{6^2-4(-9)(-1)} = \sqrt{36-4\cdot 9}$

$= \sqrt{36-36}$

$= \sqrt{0} = \boxed{0}$

Do not use $\emptyset$ for zero.

Evaluate: $\dfrac{(x-y)^2}{x+y}$ for $x=1$, and $y=-2$.

$$= \frac{(1-(-2))^2}{1+(-2)} = \frac{(1+2)^2}{-1} = \frac{3^2}{-1} = \frac{9}{-1} = \boxed{-9}$$

Evaluate $\dfrac{x^2+8x+15}{x^2-25}$ for $x=-5$

$$= \frac{(-5)^2+8(-5)+15}{(-5)^2-25} = \frac{25+(-40)+15}{25-25} = \frac{-15+15}{0} = \frac{0}{0}$$

Indeterminate

We use variable to represent some unknown.

Translate: The sum of 10 and some number

x

$10+x$

Translate: twice some number reduced by -20.

$2 \cdot x \quad -(-20)$

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

Translate: Square of Some number increased by 4 times the number.

$x^2 + 4 \cdot x = x^2 + 4x$

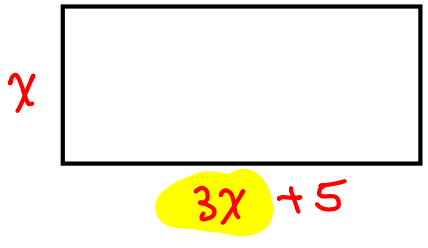
Translate: The difference of -25 and Square root of 1 more than Some number.

$-25 - \sqrt{x+1}$

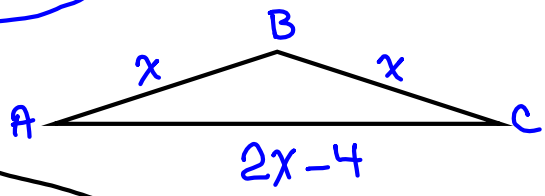
Translate: the quotient of Some number and 1 less than the number cubed.

$$\frac{x}{x^3 - 1}$$

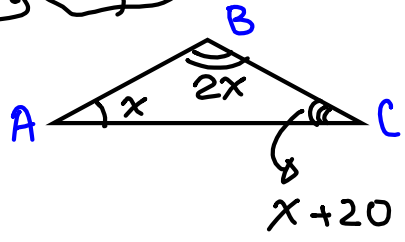
The length of Some rectangle is 5 more than 3 times its width. Draw & label such rectangle.



In triangle ABC, Two Sides are equal, the third side is 4 inches shorter than the sum of equal sides. Draw such triangle, and label it.



In triangle ABC,
Angle B is twice angle A.
Angle C is 20° more than angle A.
Draw & label such triangle.
$x°$, $(2x)°$, $(x+20)°$



Translate:
Half Some number increased by -8
is equal to 20.

$$\frac{1}{2}\cdot x + (-8) = 20 \Rightarrow \frac{x}{2} - 8 = 20$$

Translate only:
Twice the sum of Some number and 10
is equal to the number less -30

$$2(x+10) = x - (-30) \quad 2(x+10) = x+30$$

Translate only:

-3 times the difference of 10 and some number is equal to 20 less than twice the number.

$$-3(10 - x) = 2x - 20$$

Translate only: $x^3 + 30 = \sqrt{x} - 10$

Some number cubed increased by 30 is equal to Square root of the number decreased by 10.

Distributive Property:

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

$$4(x + 2) = 4x + 4 \cdot 2$$

$$= 4x + 8$$

$$-5(x - 1) = -5x - 5(-1) = -5x + 5$$

$$7(2x^2 + 3x - 4) = 14x^2 + 21x - 28$$

like terms: Same Variables & Same exponent

$4x^2$, $-2x^2$, $\frac{1}{2}x^2$, $-x^2$

$15x^3y^4$, $-10x^3y^4$, $20x^3y^4$, x^3y^4

we can collect like terms;

$7x + 3x - 4 = \boxed{10x - 4}$

$6x^2 + 10x - 2x^2 - 15x = 4x^2 - 5x$

Distribute & Simplify

$2(x^2 - 3x + 4) - 3(-x^2 - 2x + 3) + 1$

$= 2x^2 - 6x + 8 + 3x^2 + 6x - 9 + 1$

$= 5x^2 = \boxed{5x^2}$