Wednesday

1. Exponents
2. Expanding binomials
3. Activity # 1
4. WeBWork
   a. domain
   b. PEMDAS

warm-up: Simplify

$$\frac{a^3 b^{-4} c}{d a^{-3} c^2} = \frac{a^3 \cdot a^3 \, c \cdot c^{-2}}{b^4 d} = \frac{a^6 c^{-1}}{b^4 d} = \frac{a^6}{b^4 c d}$$

Exponents

- $a^m = a \cdot a \cdot a \cdots a$ (m factors)
- $a^{-1} = \frac{1}{a}$

Ex: $\dfrac{1}{a^{-1} + 5} = \dfrac{1}{\frac{1}{a} + 5 \cdot \frac{a}{a}} = \dfrac{1}{\frac{1}{a} + \frac{5a}{a}} = \dfrac{1}{\left[\frac{1+5a}{a}\right]} = \dfrac{a}{1+5a}$

common denom

incorrect: $\dfrac{a}{5}$

Ex, simplify into one quotient w/ + exponents

$$\frac{x^2}{y^{-1} + z} = \frac{x^2}{\frac{1}{y} + z\left(\frac{y}{y}\right)} = \frac{x^2}{\left(\frac{1+zy}{y}\right)} = \frac{x^2}{1} \cdot \left(\frac{y}{1+zy}\right) = \frac{x^2 y}{1+zy}$$

Formula

- $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

b/c $\left(\frac{a}{b}\right)^m = \frac{a}{b} \cdot \frac{a}{b} \cdots \frac{a}{b} = \frac{a^m}{b^m}$

Def'n

- $a^{p/q} = \sqrt[q]{a^p}$

(Ex: $3^{5/6} = \sqrt[6]{3^5}$

$2^{3/2} = \sqrt[2]{2^3} = \sqrt{8} = 2\sqrt{2}$

Expanding Binomials

$(a+b)^2 = a^2 + 2ab + b^2$

↓ FOIL

$(a+b)\cdot(a+b) = a^2 + ab + ba + b^2$ ↑ ∵

if: $a = 2$, $b = 3$

$(2+3)^2 = 5^2 = 25$

$2^2 + 3^2 = 13$

$(a+b)^3 = (a+b)(a+b)^2$

$= (a+b)(a^2 + 2ab + b^2)$ (from above)

$= a(a^2 + 2ab + b^2) + b(a^2 + 2ab + b^2)$

$= a^3 + 2a^2b + ab^2 + a^2b + 2ab^2 + b^3$

$= a^3 + 3a^2b + 3ab^2 + b^3$

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

Degree: highest exponent

Degree sum: sum of degrees in a term

ex: degree sum = 3

a^3 (degree 3) & a^2b

Pascal's Δ

```
        1
      1   1
    1   2   1
  1   3   3   1
1   4   6   4   1
```

give coefficients (#'s in front)

& degree sum is constant

$(a+b)^3 = 1a^3 + 3a^2b + 3ab^2 + 1b^3$

Ex $(a-b)^2 = a^2 - 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ (signs alternate)

Ex $(2x-y)^3 = (2x)^3 - 3(2x)^2 \cdot y + 3(2x)y^2 - y^3$

$a = 2x$ $= 8x^3 - 12x^2y + 6xy^2 - y^3$

$b = y$

$(a-b)^3 =$