

MA271 FRIDAY WEEK 1

Numbers & set notation.



Give all numbers from -6 to 3, excluding 0 & 3
exclude 0 & 3

$$[-6, 0) \cup (0, 3)$$



include -6

From -6 to 3, excluding 1, 2 & all between

$$[-6, 1) \cup (2, 3]$$



From -6 to 3, include 1, 2 but not #'s between 1 & 2

$$[-6, 1] \cup [2, 3]$$

Exponents:

Two facts:

$$1. \ a^m = \underbrace{a \cdot a \cdot a \dots a}_{m \text{ times}}, \text{ so } a^5 = a \cdot a \cdot a \cdot a \cdot a$$

$$2. \ a^{-1} = \frac{1}{a} \quad \therefore \text{so } \frac{1}{a^{-1}} = a, \quad \frac{1}{2^{-1}} = 2$$

$$\frac{1}{\left(\frac{1}{2}\right)} = 1 \cdot \frac{2}{1} = 2$$

Multiply Like Bases: $a^5 \cdot a^2 = a^7$, $a^5 \cdot a^{-2} = a^3$

Divide bases: $\frac{a^5}{a^2} = a^3$, $\frac{a^5}{a^{-2}} = a^7$

Raise powers to other powers

$$(a^5)^2 = a^5 \cdot a^5 = a^{10}$$

$$\begin{aligned} & a^4 + 2a^2 + 1 \\ & 1 \cdot 1 + 1 \cdot a^2 + a^2 \cdot 1 + a^4 \\ & \underbrace{(1+a^2)(1+a^2)} = (1+a^2)^2 \end{aligned}$$

NO!

$$\left(\frac{3}{1+a^2}\right)^2 = \frac{3^2}{1^2 + (a^2)^2} = \frac{3^2}{1+a^4}$$

Fraction & Exponents:

$$\left(\frac{3}{a^2 b}\right)^2$$

$$\left(\frac{3}{1+a^2}\right)^2 = \left(\frac{3}{1+a^2}\right) \left(\frac{3}{1+a^2}\right) = \frac{3^2}{(1+a^2)^2} = \frac{9}{1+2a^2+a^4}$$

$$\frac{3}{a^2 b} \cdot \frac{3}{a^2 b} = \frac{3^2}{a^2 b a^2 b} = \frac{3^2}{a^4 b^2}$$

$$\left(\frac{3^2}{a^4 b^2}\right)$$

$$\frac{(a^2 b)^2}{a^2 b a^2 b}$$

Practice

simplify

$$\left(\frac{x^2}{-2}\right)^4 = \frac{x^{2 \cdot 4}}{(-2)^4} = \frac{x^8}{16}$$

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

$$\frac{(3t)^{-1}}{-3t^{-1}} = \frac{1}{(-3)3t} = \frac{1}{-9}$$

$$(\pi^0 x^2 a^{-1})^{-1} = \pi^0 x^{-2} a^1 = \frac{a}{x^2}$$

$$(3m^{-2} n^4)^{-2} = 3^{-2} m^{(-2)(-2)} n^{4(-2)} = \frac{m^4 n^{-8}}{9}$$

Rules:

$$(AB)^m = A^m B^m$$

$$(A+B)^m \neq A^m + B^m$$

$$= \frac{m^4}{9n^8}$$

Multiplication of Algebraic Expressions (1.8)

$$(x-3)(x+5)$$

$$x^2 + 5x - 3x - 15$$

$$x^2 + 2x - 15$$

$$(3y^2 + 2)(2y - 9)$$

$$(3y^2)(2y) - 3y^2(9) + 2(2y) - 2 \cdot 9$$

$$6y^3 - 27y^2 + 4y - 18$$

$$[(x-2)^2(x+2)]^2$$

$$[(x-2)(x-2)(x+2)]^2$$

$$[(x-2)(x^2-4)]^2$$

$$(x^3 - 4x - 2x^2 + 8)(x^3 - 4x - 2x^2 + 8)$$

$$x^6 - 4x^4 - 2x^5 + 8x^3 + 16x^2 - 32x + 64$$

$$-4x^4 + 8x^3 - 16x^2 - 32x$$

$$+4x^4 - 2x^5 + 8x^3 - 16x^2$$

$$8x^3$$

$$x^6 - 4x^4 - 4x^5 + 32x^3 - 16x^2 - 64x + 64$$

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

$$a^2 - b^2$$