

# SET THEORY NOTATION

ACTATION

(1) braces industry the hoppings and and of a struministic when betal, disserts on reachest man be expected by context. EX. A. = (4,8,16); see at First Ferdings, or being a less of directed industry in industrial context in the obstacle in the second of a gattern. EX. B. = [1, 10, 15, ..., 15, 90].

EX. C. = (3, 6, 4, 15, ...)

In a symbol which limitely recent which is, new with the ball element of the second of the secon

AC B indicates the every element of set A is also an element of set B.

EX: 0'A = [3, 6] and B = [1, 3, 5, 6, 7, 9] then ACB because the 3 and 6

P is the number of advants of a set when n equals the number of elements in that set  $EX \cap FA = \{4,5,6\}$  then set A has B subsets because A has B elements and  $B \cap FA = \{4,5,6\}$  then set A has B subsets because A has B elements and

O security states. As M is addressed the uniform of set A with one B, every element of this set in order as element of  $\gamma$  of A OB on element of set B. But it is, so from the monor of two elements of set A of B on element of set A is a contract of the element of A of A

A indicate the complement of set A; then is, all elements in the universal set which are NOT in set A. EX; If the Universal set is the set of

## integers and $A=[0,1,2,3,\ldots]$ then $\overline{A}:[-1,-2,-3,-4,\ldots]$ , $A\cap \overline{A}:=\emptyset$ .

reons "is equivalent to"; that is, set A and set B have the same number of el ersents although the elements thermolives may or may not be the same. EX I A = [2,4,6] and B = [6,12] Big then A = B because m(A) = 3 and m(B) = 3.

•  $A \cap B = 20$  indicates this obtained which have the elements on common.

\*\* Substantial of Countries of State of Countries of Countries of Countries of Countries (S. 2, 3, 4, 5, ... 11, 12, ...)

\*\*Whole numbers = [0, 1, 2, 3, ... 10, 11, 12, 13, ...]

\*\*Integers = [0, 1, 4, 5, 2, 1, 0, 1, 2, 3, ...]

Rational numbers - [priq | p and q are integers, q at 0]; the acts of National numbers, Whole numbers, and integers, or well as numbers which on be written on proper or improper fractions, are all rubsets of the set of

viational numbers  $-\uparrow x \mid x$  is a Real number but is not a Rational number; the sets of Rational numbers and Irrational numbers have no element in operation and are therefore disjoint sets.

Real numbers — [X ] X is the coordinate of a point on a number line; the union of the set of Rational numbers with the set of fun-tional numbers outsit the set of Raul numbers.

Transplacery numbers: [all] a is a Roal purpler and I is the number whose expans in all; I is -1, the sots of Real numbers and I magning numbers have no elections in common and are therefore disjoint sets

#### PROPERTIES OF REAL NUMBERS

PROPERTY	FOR RECEDE	POH MULTIPLICATION
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Commercial Res.	athebra	alone lea
Assertable:	\$0+1\$+2+x+(b+4)	(altor malle)
Ideatity	# fig = print(# file or	atlenadites
heons	4 + (-a) + 8 (sol) (-a) + a = 0	3 - % = 1 and 0, - a = 1 if a > 0

### PROPERTIES OF EQUALITY

Methodo: a = a
Symmetric Ha = b dyn b = a
Transitive: If a = b and b = c finn a = c
Addison Property: If a = b den a = c = b = c
Natisplication Property: If a = b den a = = b c
Natisplication Property of Zero: a = 0 = 8 and 8 + a = 8

Deable Negative Property: -6-60-74

PROPERTIES OF INEQUALITY

Brichetong: Ether a = b, or a = b, or a = b Transition: If a < b, and b < a three a < a

Middle State Property of Secondition 15 a. 8 and a 2 h Second 2 hor

N=x if x is zero or a positive number; |x| = -x if x is a negative number that is, the distance (which is always positive) of a number from zero on it number like is the absolute value of that number. EXec | -4| = -(-4) = |23| = |25| = |0| = |(-4)| = -(-4) = |3|.

[27] = 22; [4] = 0; [-43] = -(-43) = 1.

ADDITION

If the signs of the numbers are the name add the absolute values of the numbers, the sign of the numbers is the some as the signs of the original to numbers. EXx: -11 = -5 = -16 and 16 + 10 = 26

If the signs of the numbers are different, subtract the absolute the numbers, the masses has the same sign as the number with absolute value, EXs: 46 + 4 = 42 and 3 + 10 = 7

aboline white, EXx. 46 + 4 = 12 and 3 + 10 = 7SUBTRACTION b = a + 16b, indirection is changed to addition of the appealir namely that is, during the sign of the record namely and follow the rules of addition in the sign of t

EXst (55)(3) = 165; (-30)(-4) = 120; (-5)(-12) = 60

The product of two marrisons which have different signs is negative to much which marrier is larger EXe (-3)(70) = -200; (21)(-40) = -840; (50)(-3) = -15

## DIVISION (DAVISORS DO NOT COURL ZERO)

The quotient of two numbers with these the same wigh is possible E(x; (-144)/47) = 2; (46), (41) = 4; (-46)/6; (6) = 5. The quotient of two numbers which have different signs is negative a matter which marrier is large. E(x; (-24)/66) = -4; (48)/(-8) = -5; (-14)/(56) = -25.

### DOUBLE NEGATIVE

se source is -1), the set of Real members and the set of Imparines made a change at that is, the requires sign changes the sign of the contents of the new both subsets of the set of Complex members. Exec. 4-40-2 (1/2) (1/2

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#### SET THEORY

#### NOTATION

- ( ) braces indicate the beginning and end of a set notation; when listed, elensembs or members must be separated by company  $EX: A = \{4,3,16\}$ ; our are finite tending, or having a last obscient) unless otherwise indicated. indicates confination of a pottern. EX: B = [5, 18, 15, ..., 85, 98]
- at the end indicates an infinite set, that is, a set with no last element. EX: C = [3, 6, 9, 12, ...]
- is a symbol which bitcouly recens "such that."
   iii assembler of "OR "is an element of "EX: If A = [4, 8, 12]
- then 12 C A because 12 is in set A.
- ♥ means "o not a member of "OR. "is not an element of." EX: if B = [2, 4, 6, 8] then 3♥B because 3 is not in set B.
   ♥ means empty set OR, mail set a set containing no elements or mem-
- here, but which is a subact of all sets; also notifica to [ ].
- means "is a subset of;" also may be written as C
- I means "in ear a subset of," also may be written as L
- · AC II indicates that every element of set A is also an element of set II EX: If  $A = \{3,6\}$  and  $B = \{1,3,5,6,7,8\}$  then  $A \subseteq B$  because the 3 and 6 which are in set A are also in set B.
- 29 is the number of salesets of a set when a equals the number of element in that set, EX: If A = [4, 5, 6] then set A has 8 subsets because A has 8 elements and  $2^2 = 8$ .

#### **OPERATIONS** · Limiter series.

- · AU B indicates the union of set A with set B; every element of this set is either an element of set A OR on element of set ilk that is, to form the union of two sets, put all of the elements of both sets together into one a making sare not to write any element more than once. EX: If A = (2.4) and B = [4, 8, 16] then A U B = (2, 4, 8, 16).
  - D means intersection
- . AftB indicates the intersection of set A with set B; every element of this set in also an element of BOTH set A and set Be that is, to form the in terraction of two sets, list only those elements which are found in BOTH of the two cuts. EX: If  $A = \{2,4\}$  and  $B = \{4,8,16\}$  then  $A \cap B = \{4\}$ .
- A indicates the complement of set A; that is, all elements in the univer sal set which are NOT to set A. EX: If the Universal set is the set of integers and  $A=\{0,1,2,3,...\}$  then  $\overline{A}$  (-1, -2, -3, -4,...)  $A\cap \overline{A}=\emptyset$ .

### PROPERTIES A = B means all of the elements in set A are also in set B and all sig-ments in set B are also in set A, although they do not have to be in the

- some order, EX: If A = (5, 10) and B = (10, 5) then A = B. n(A) indicates the number of elements in set A. EX: If A = (2, 4, 6) then
- . means "is equivalent to"; that is, set A and set B have the same number of el ersents although the elements themselves may or may not be the same. EX: It
- $A = \{2, 4, 6\}$  and  $B = \{6, 12, 18\}$  then A = B because a(A) = 3 and a(B) = 3. A ∩ B = Ø indicates disjoint sets which have no elements in common.

#### SETS OF NUMBERS

- Natural or Counting numbers = (1, 2, 3, 4, 5, ..., 11, 12, ...)
- \*Whole numbers = [0, 1, 2, 3,..., 10, 11, 12, 13, ...]
- \* Integers = (..., -4, -3, -2, -1, 0, 1, 2, 3, 4, ...)
- Rational numbers {p(q | p and q are integers, q at 0); the acts of Nat-ural numbers. Whole numbers, and integers, or well as numbers which can be written as proper or improper fractions, are all rabsets of the set of Rational numbers
- Irrational numbers ( x | x is a Real number but is not a Rational num ber); the sets of Rational numbers and Irrational numbers have no elsments in common and are therefore disjoint acts.
- \*Real numbers (x | x is the coordinate of a point on a number line; the union of the set of Rational numbers with the set of Imptional marriters equals the set of Real numbers.
- Imaginary numbers = [all] a is a Real number and l is the number. whose square is  $-1 \ge J^2 = -1$ , the sets of Real numbers and Imaginary numbers have no electreats in common and are therefore disjoint sets.
- Compiles numbers (a + bi) a and have Basi monbers and i is the number. whose square is -1; the set of Real numbers and the set of insugance men-bers are both subsets of the set of Complex numbers. EXs: 4-4000 (1991)

## PROPERTIES OF REAL NUMBERS

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PROPERTY	FOR A SOTTON	POH MULTIPLICATION
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lwors	4 + (-a) + 8 (cd) (-a) - a = 0	3 - 5 - 1 and 5 - 2 - 1 fa - 6

### Distributive Property of the circ ship are of the circ ship ar

### PROPERTIES OF EQUALITY

Reflecte: a = a

Sommetrie: If a - b then b - a Transitive: If a=b and b=c tion a=c

Addition Property: If a - h then a + c - h + c Multiplication Property: If a = h then ac = he Multiplication Property of Zero: a+4-8 and 8+a-8

Deable Negative Property: -(-a)= s.

## PROPERTIES OF INEQUALITY FOR ANY REAL MUMBERS A, B, ANG o

Brichetome: Erhor a = b, or a = b, or a = b

Translitue: If a < b, and b < a throat c a

Addition Property of Inequalities: If a + b then a + e + b + e

Molitplication Property of Integralities: If e # 0 and e > 0, and a > 6 then se > be;

aton, if a < b then as < bc. Heat Landa Silt, and a bit because Silver also, if a < b force or b he

### OPERATIONS OF REAL NUMBERS

#### ABSOLUTE VALUE

 $|\mathbf{x}| = \mathbf{x}$  if  $\mathbf{x}$  is zero or a positive number:  $|\mathbf{x}| = -\mathbf{x}$  if  $\mathbf{x}$  is a negative number that is, the distance (which is always positive) of a number from zero on the number line is the absolute value of that number.  $EX_{0}$ : |-4| = -(-4) = 4: 29 = 29; (0) = 0; (-43) = - (-43) = 43

#### ADDITION

If the signs of the numbers are the same, add the absolute values of the sambon, the sign of the answer is the same as the signs of the original tw nambers. EXx: -11 + -5 = -16 and 16 + 10 = 26.

Like signs of the numbers are different: subtract the absolute subsex the numbers: the answer has the same sign as the number with the larger absolute value, EXs: -46 + 4 = -12 and -3 + 10 = 7

#### SUBTRACTION

a - b = a + (-b); subtraction is changed to addition of the apposite number that is, change the sign of the second marker and follow the rules of addition tnever change the sign of the first number since it is the number in back of the subtraction sign which is being subtracted;  $14 - 6 \neq -14 + -6$ . EXts: 15 + 42 - 15 + 442 = -27 = 24 + 5 = -24 + (-5) = -29 = (3 + (-45) + (-13 + (-45) + 32) = 62 + (+20) = -42

#### MULTIPLICATION

he product of two cumbers which have the same signs is positive EX:(55)(3) = 165; (-30)(-4) = 120; (-5)(-12) = 60

The peodoct of two marrison which larve different stone is navative to much which number is larger, EXx: (-3)(70) = -210; (21)(-40) = -840; (50)(-3) = -150

#### DIVISION (DAVISORS DO NOT EQUAL ZERO)

The quotient of two numbers which have the same sign is positive EXe: (-14) / (-7) = 2: (40 / (11) = 4: +-0 / (-10 = 3

The quotient of two numbers which have different algae is negative a matter which number is larger.

 $EX_{81}(-24)/(6) = -4;$  (40)/(-8) = -5; (-14)/(56) = -.25

#### DOUBLE NEGATIVE

 $A_{\rm c} = A_{\rm c}$  that is, the regative sign changes the sign of the contents of the conten

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