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- Teaching Exp. 8 Yrs.

### **Rank Produced by Etoos**

#### **AIR-24**



#### SURAJ SANJAY JOG And Many Others

# How to Study Maths For IIT-JEE

(i) Write and not read maths

# How to Study Maths For IIT-JEE

(i) Write and not read maths

(ii) Try to apply using formulas /tricks given

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(i) Write and not read maths

(ii) Try to apply using formulas /tricks given

(iii) Practice Practice Practice

# How to Make Best use of the Course

**Important points / formulas are highlighted** 



# How to Make Best use of the Course

**Important points / formulas are highlighted** 



**Complete Assignment before moving to next lecture** 

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Logrithms **Trigonometry Identities (Trigo – Ph1) Quadratic Equation** Sequence & Series **Trigonometry Ph-2** (Trigonometry Equation)

# Solutions Of Triangle (Trigo Ph-3) Straight Lines and Pair of Straight Lines Circles Permutation & Combination

**Binomial Theorem** 

Functions

Limit

Continuity

Derivability Method Of Derivative **Indefinite Integration Definite Integration Application Of Derivatives** 

Vectors

**3D** Geometry

Determinant

Matrics

**Probability** 

**Complex No. Differential Equation Area Under Curve** Parabola Ellipse Hyperbola

- $\neq$  (not equal)
- < (less than)
- > (greater than)
- $\leq$  (less than or equal to)
- $\geq$  (greater than or equal to)
- () (parentheses)
- & (and)
  - .. [ellipsis (and so on)]
  - : (therefore)
- % (percent)

 $\begin{array}{ll} \pi & (pi) \\ \angle & (angle) \end{array}$ 

0

Æ

- (degree)
  - (perpendicular)
  - (parallel)
- ~ (is similar to)
  - J (union)
- $\cap$  (intersection)
- $\in$  (is a member of)
  - (is not a member of)

- (is proper subset of)
- $\exists$  (there exists)
- ∀ [(for all (universal quantifier)]
  - (is equal to or)
    - (is equivalent)
- $\wedge$  (and)

2

 $\bigvee$ 

- (or)
- $\subseteq$  (is subset of)
- $\supseteq$  (is super set of)
- $\Leftrightarrow$  (iff or implies and is implied by)

- $\approx$  $\infty$ Σ ω θ Э
- (is approxima)
- (infinity)
- (factorial)
  - (sigma)
- (square root)
- ω (omega)
- **(gamma)**
- θ (theta)
- **Example 1 (such that)**
- Φ (phi)

- Ω (omega)
- $\Delta \qquad (delta)$
- **∏** (pi)
- $\rightarrow$  (arrow)
- $\partial$  (derivative partial)
  - (integral)
- $\infty$  (proportional)
- **±** (plus or minus)
- **R** (set of real number)

#### • Remember Tables 1-19

- Remember Tables 1-19
- Remember Squares 1-32

- Remember Tables 1-19
- Remember Squares 1-32
- Remember Cubes 1-12

### **Componendo & Dividendo**



# $\frac{N-D}{N+D}$

To be applied both sides of the equation.

• 
$$\left(a^{x}\right)^{y} = a^{xy}$$

 $\cdot \frac{a^x}{a^y} = a^{x-y}$ •  $(a^x)^y = a^{xy}$ 

• 
$$(a^x)^y = a^{xy}$$
 •  $\frac{a^x}{a^y} = a^{x-y}$ 

•  $\mathbf{a}^{\mathbf{x}} \cdot \mathbf{a}^{\mathbf{y}} = \mathbf{a}^{\mathbf{x}+\mathbf{y}}$ 

• 
$$(a^x)^y = a^{xy}$$
 •  $\frac{a^x}{a^y} = a^{x-y}$   
•  $a^x \cdot a^y = a^{x+y}$  •  $x^a \cdot y^a = (xy)^a$ 

### Additive Inverse,

### Additive Inverse,

### Additive Identity,

#### Additive Inverse,

### Additive Identity,

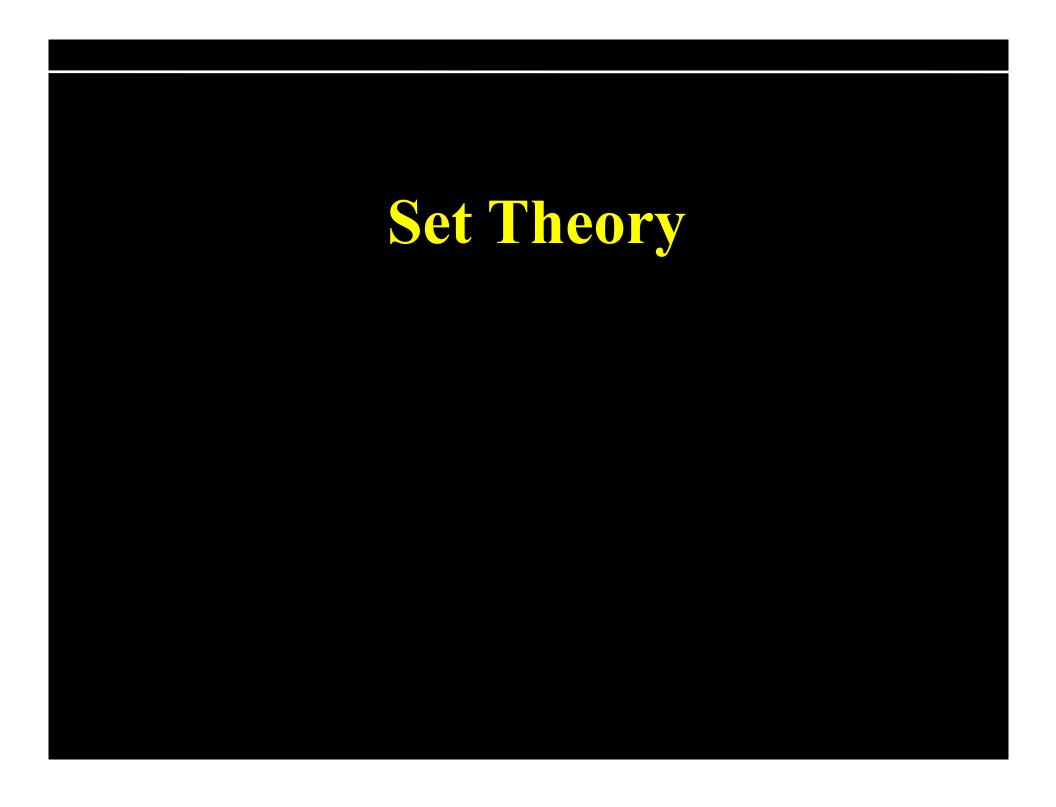
### **Multiplicative Inverse,**

Additive Inverse,

Additive Identity,

**Multiplicative Inverse**,

**Multiplicative Identity** 



#### **Classification of Sets**

#### **Classification of Sets**

#### • Roster or Tabular Form

#### **Classification of Sets**

• Roster or Tabular Form

• Set – Builder Form

# **Quadratic Equation**

# Inequalities

• 
$$a^2 - b^2 = (a - b) (a + b)$$

• 
$$a^2 - b^2 = (a - b) (a + b)$$

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

• 
$$a^2 - b^2 = (a - b) (a + b)$$

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

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

• 
$$a^2 - b^2 = (a - b) (a + b)$$

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

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

 $a^{3}+b^{3}+c^{3}-3abc = (a + b + c) (\Sigma a^{2} - \Sigma ab)$ 

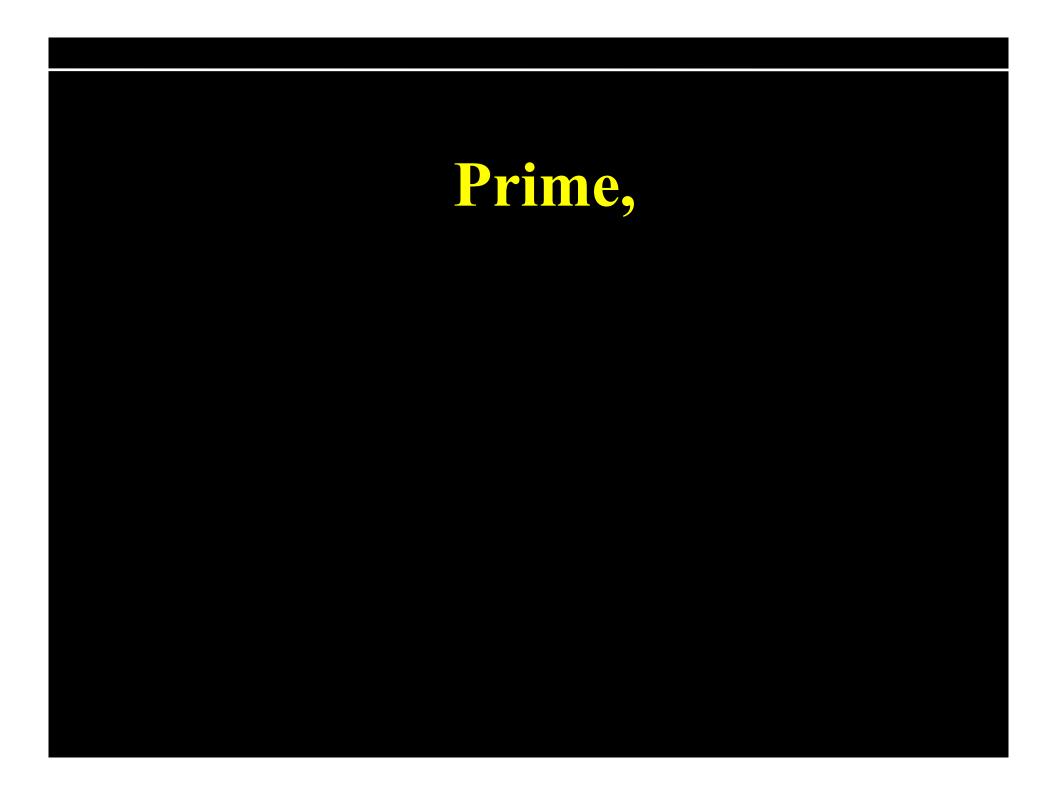
## **Number Theory**

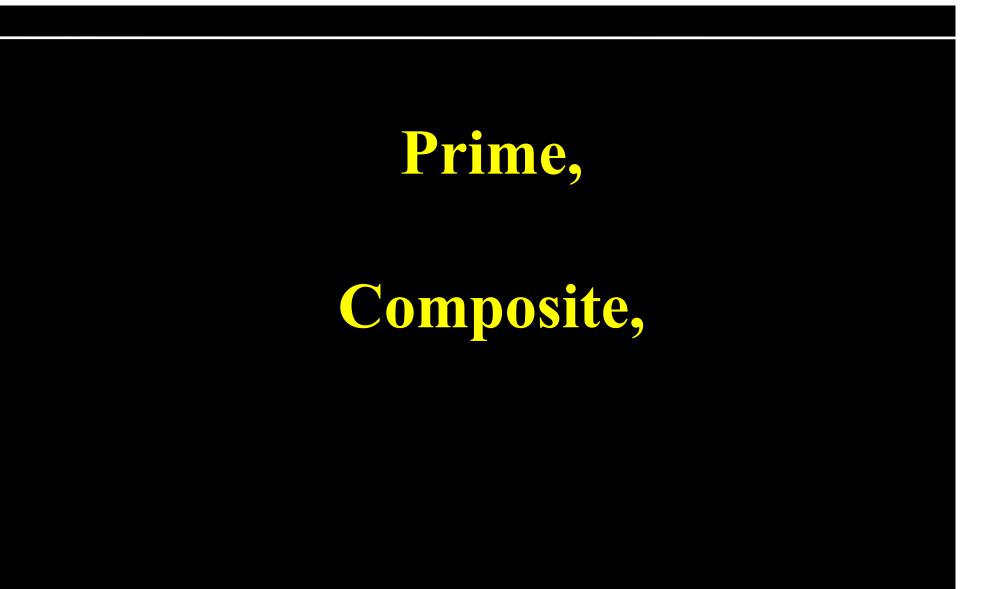
## **Number Theory**

• Natural Number (N)

## **Number Theory**

- Natural Number (N)
- Whole Number (W)

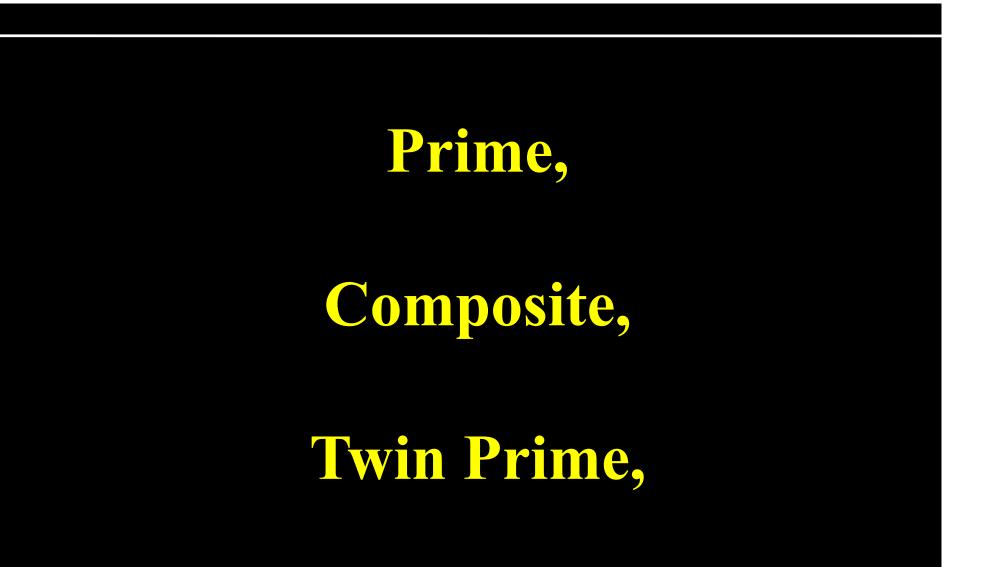




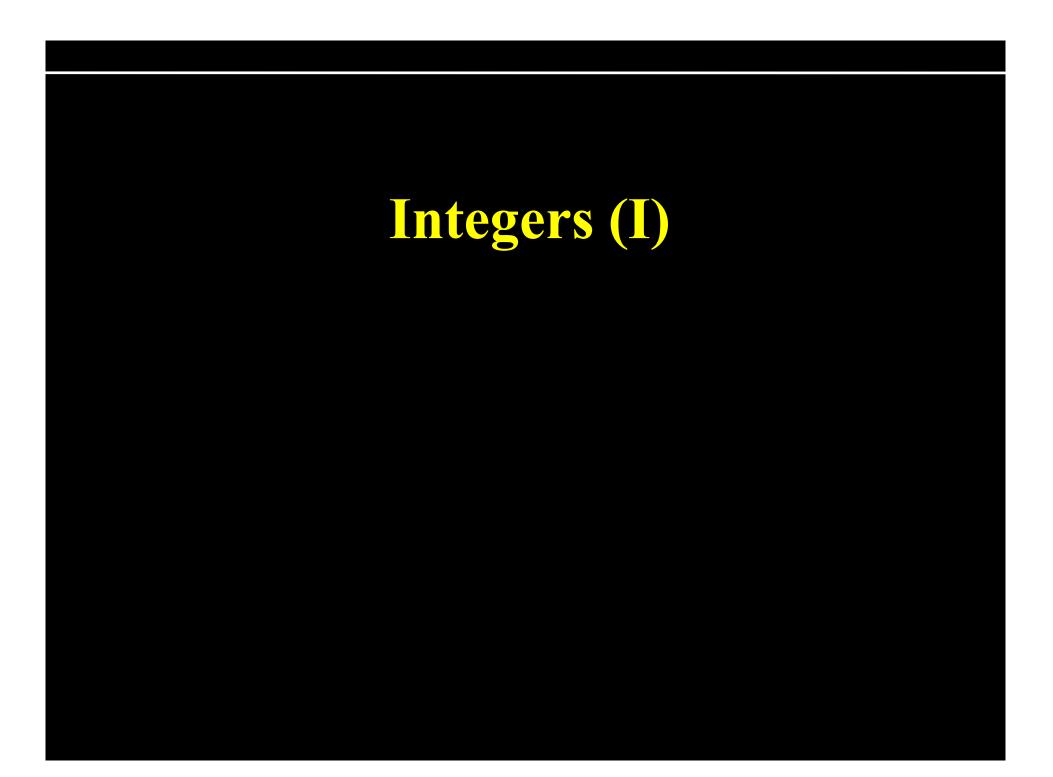


## Composite,

Twin Prime,



**Co- Prime** 



## **Rational Numbers (Q)**

### **Rational Numbers (Q)**

• Converting Decimal to p/q form

## **Rational Numbers (Q)**

- Converting Decimal to p/q form
- Example
  - 2.5 = ?3.14 = ?

#### **Irrational Numbers**

# Real Numbers (R)

## **Complex Number** (Z)

# $\overline{\mathbf{N} \subset \mathbf{W} \subset \mathbf{I} \subset \mathbf{Q} \subset \mathbf{R} \subset \mathbf{Z}}$



$$\sum_{x} \left( N = a^{x} \right)$$

#### • a>0 & a≠1

$$\sum_{x} \left( N = a^{x} \right)$$

#### a>0 & a≠1

a is called 'base' and
 x is called 'exponent'

### Logarithmic form

 $\log_a N = x$ 

### Logarithmic form

#### $\log_a N = x$

#### $Log_a N$ is defined when N > O, a > o, $a \neq 1$

## Logarithm Form

### Logarithm Form

1. Examples on value of Logarithm Find values :

### **Logarithm Form**

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•  $\log_{81}27 = ?$ 

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•  $\log_{625} 125 = ?$ 

# **Logarithm Form**

1. Examples on value of Logarithm Find values :

•  $\log_{81}27 = ?$  •  $\log_2(\log_2 4) = ?$ 

•  $\log_{625} 125 = ?$  •  $\log_{1/3} 9\sqrt{3} = ?$ 

### **Fundamental Logarithm Identity**







#### • $\log_N N = 1$



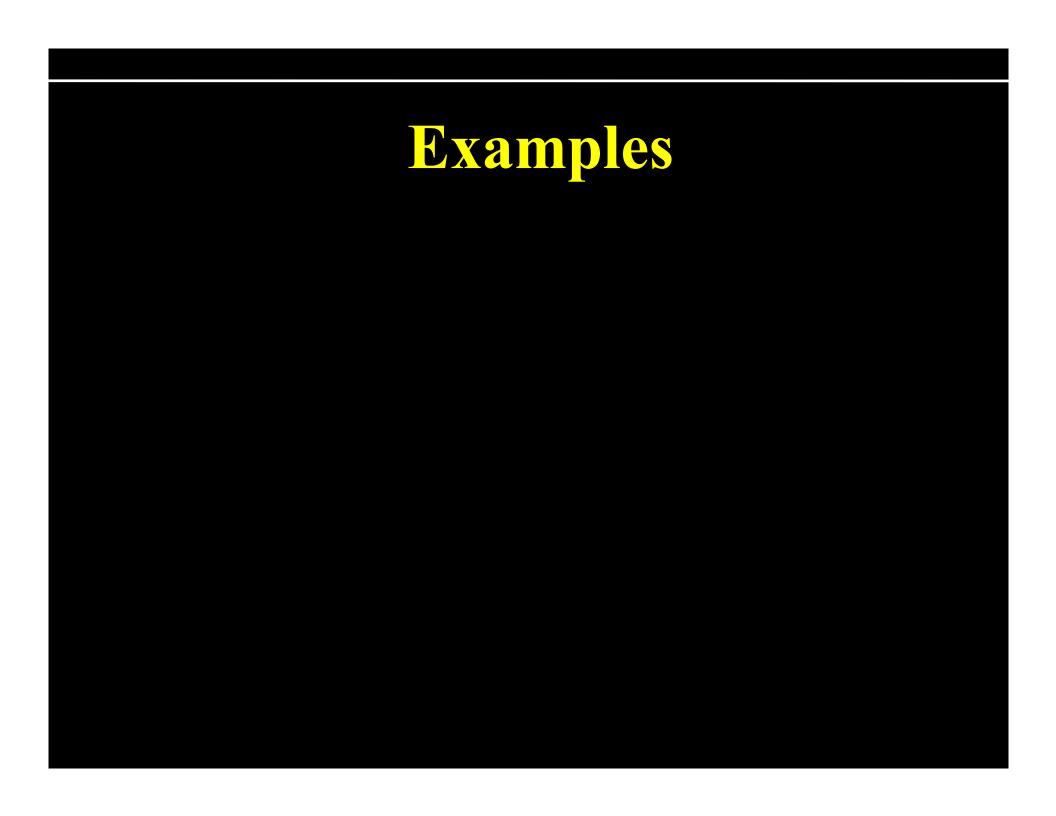
•  $\log_N N = 1$ 

•  $\log_{\frac{1}{N}} N = -1$ 



•  $\log_N N = 1$ 

- $\log_{\frac{1}{N}} N = -1$
- $\log_a 1 = 0$



Find values :

•  $\log_{tan 20^{\circ}} tan 70^{\circ} = ?$ 

Find values :

- $\log_{tan 20^\circ} tan 70^\circ = ?$
- $\log_{2-\sqrt{3}}(2+\sqrt{3}) = ?$

Find values :

•  $\log_{tan 20^{\circ}} tan 70^{\circ} = ?$ 

• 
$$\log_{2-\sqrt{3}}(2+\sqrt{3}) = ?$$

• 
$$\log_{10}(0.\overline{9}) = ?$$

Find values :

•  $\log_{tan 20^{\circ}} tan 70^{\circ} = ?$ 

• 
$$\log_{2-\sqrt{3}}(2+\sqrt{3}) = ?$$

• 
$$\log_{10}(0.\overline{9}) = ?$$

• 
$$\log_5 \sqrt{5.\sqrt{5.\sqrt{5....\infty}}} = ?$$

(Integer Type)

• The value of :

$$6 + \log_3 \left( \frac{1}{3\sqrt{2}} \sqrt{4 - \frac{1}{3\sqrt{2}}} \sqrt{4 - \frac{1}{3\sqrt{2}}} \sqrt{4 - \frac{1}{3\sqrt{2}}} \sqrt{4 - \frac{1}{3\sqrt{2}}} \right)$$
 is

[JEE 2012, 4]



#### Solve :

#### • $7^{\log_7 x} + 2x + 9 = 0$

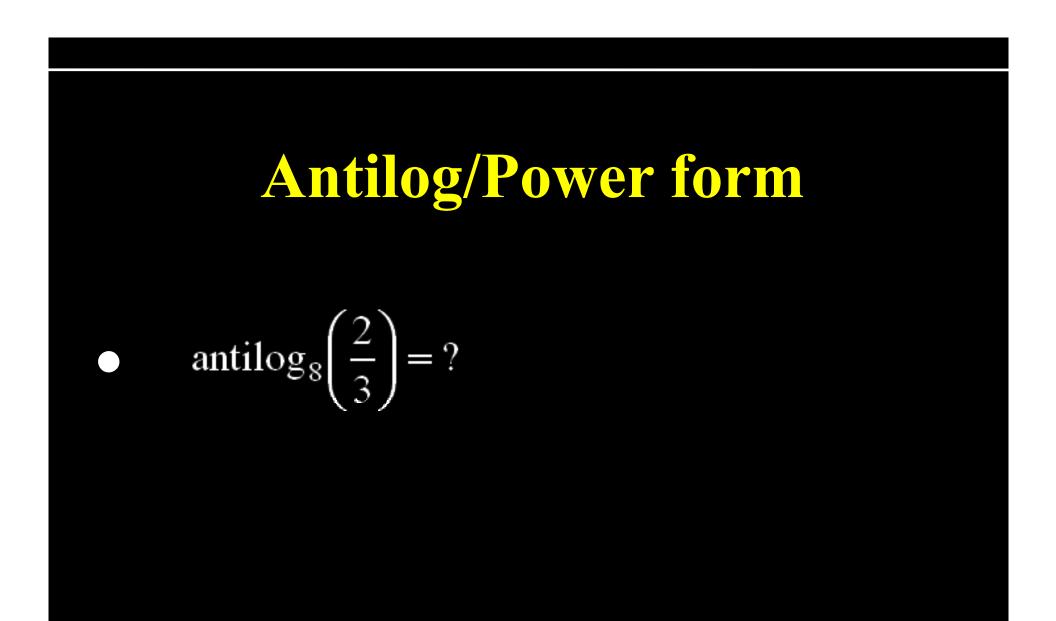


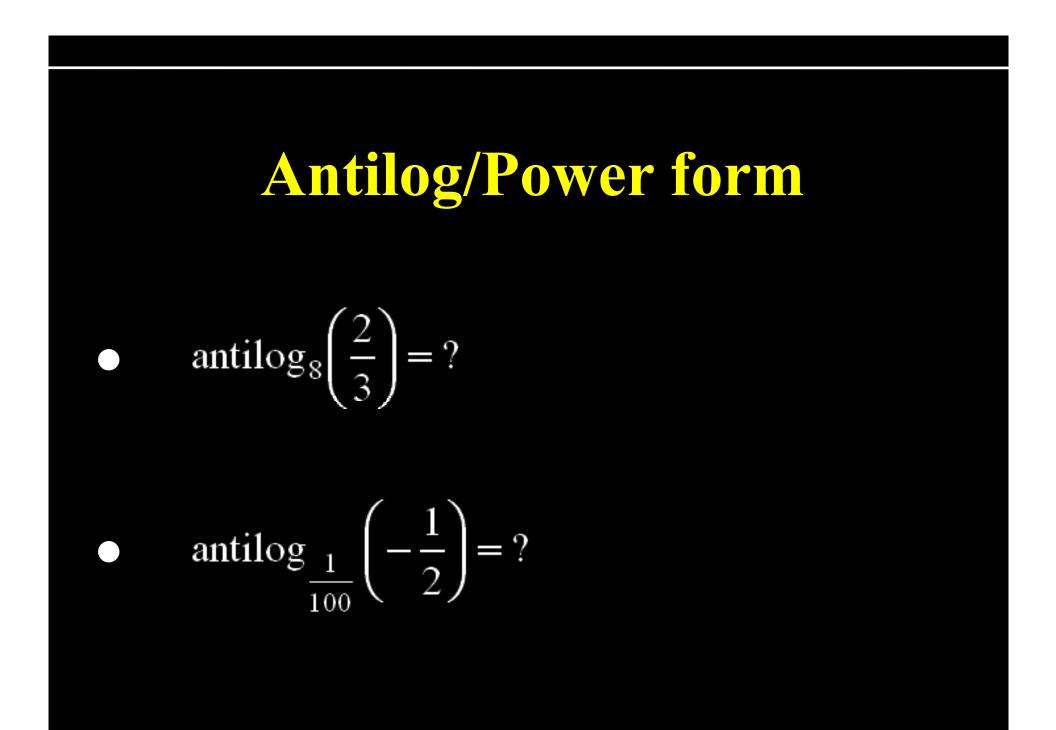
Solve :

•  $7^{\log_7 x} + 2x + 9 = 0$ 

#### log(tan5)log(tan9)log(tan13).....log(tan61)=?

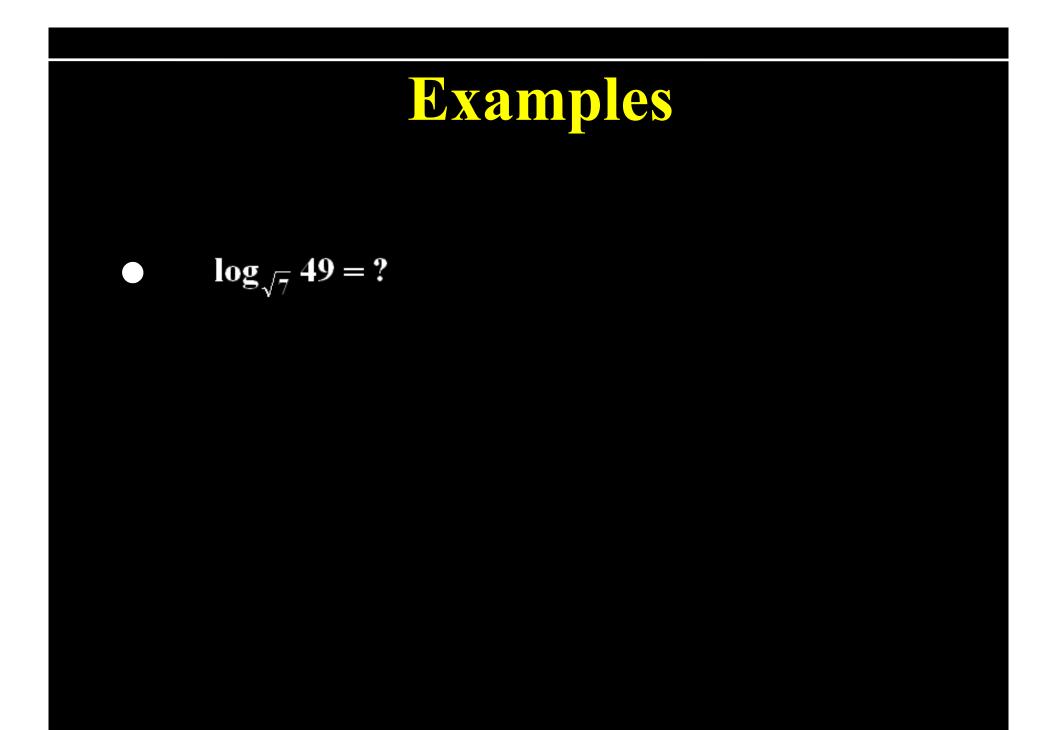
# **Antilog/Power form**

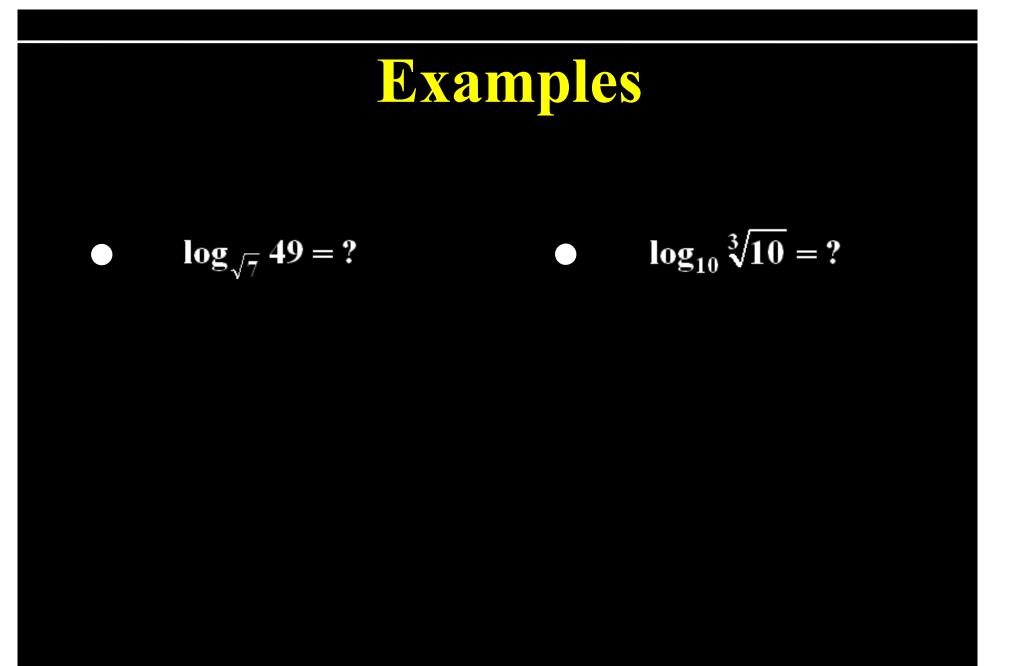


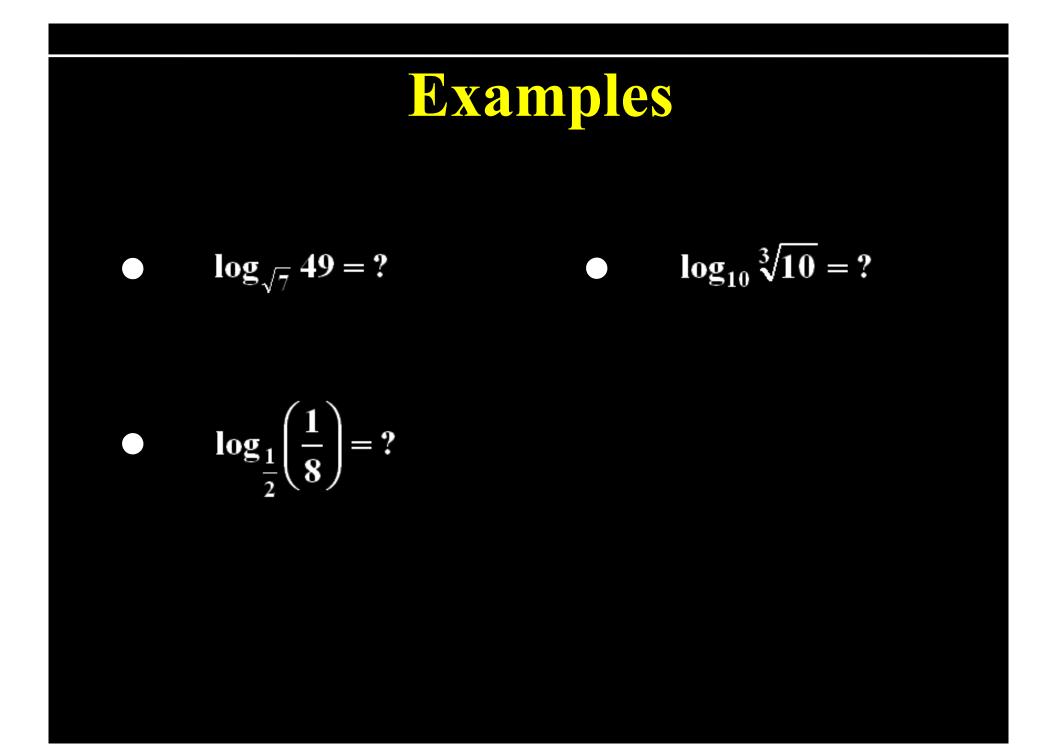


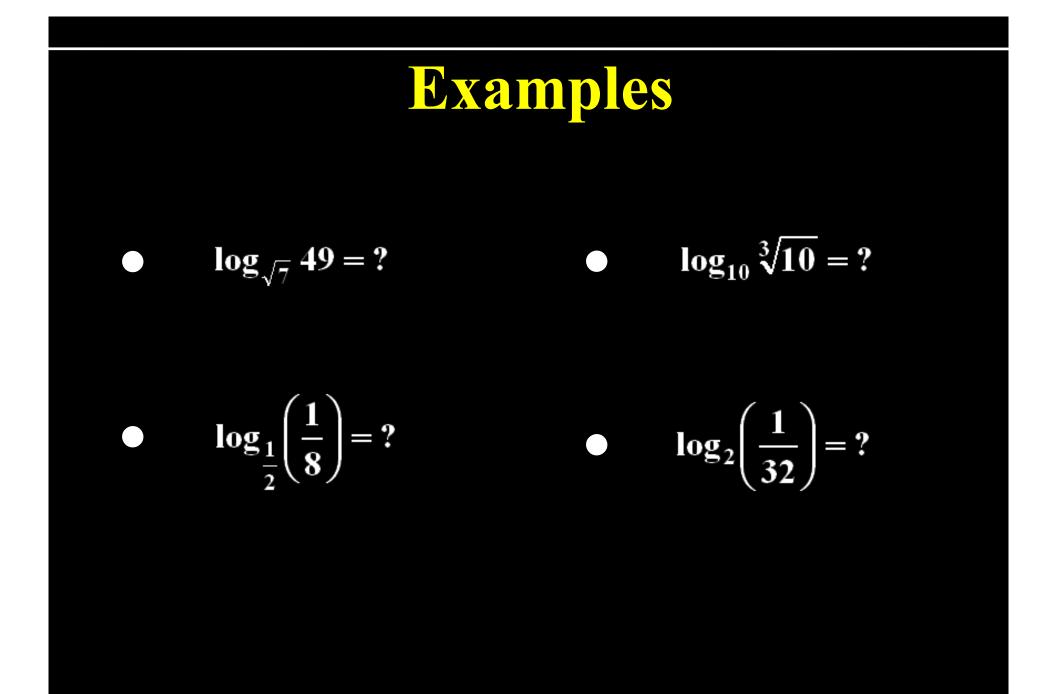
## Note

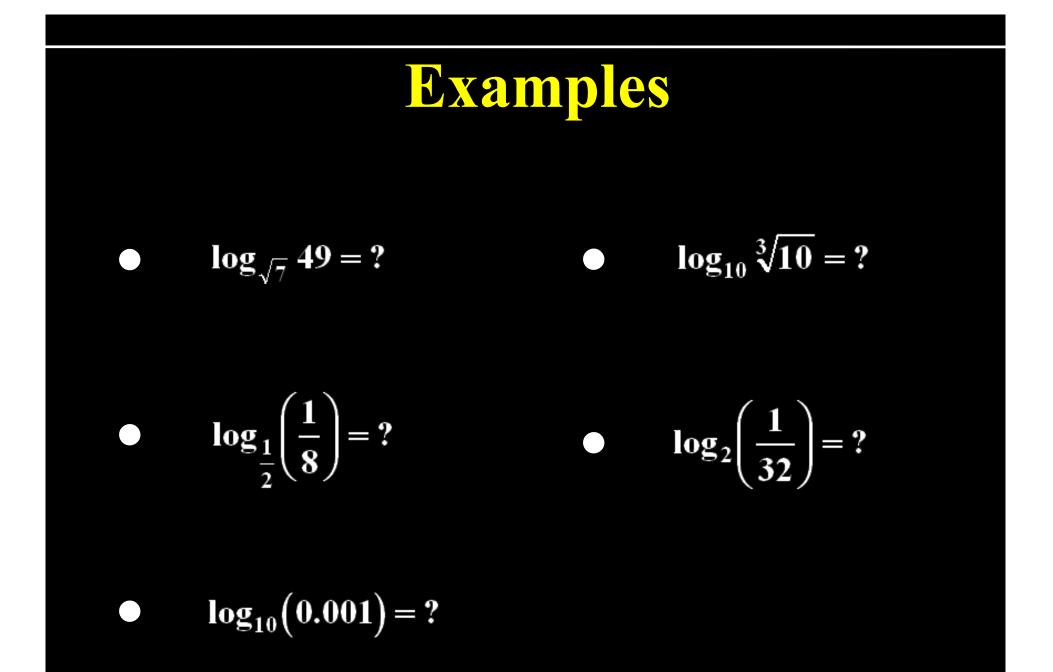
It must be noted that whenever the number and the base are on the same side of unity then logarithm of that number to that base is (+ve), however if the number and the base are located on different side of unity them logarithm of that number to that base is (-ve)











# • $\log_a mn = \log_a m + \log_a n$

- $\log_a mn = \log_a m + \log_a n$
- $\log_a \frac{m}{n} = \log_a m \log_a n$

- $\log_a mn = \log_a m + \log_a n$
- $\log_a \frac{m}{n} = \log_a m \log_a n$
- $\log_a m^x = x \log_a m$

- $\log_a mn = \log_a m + \log_a n$
- $\log_a \frac{m}{n} = \log_a m \log_a n$
- $\log_a m^x = x \log_a m$

• 
$$\log_{n^y} m = \frac{1}{y} \log_n m$$

## Note

# $\log_2 x^2 = 4$ and $2\log_2 x = 4$ will not have the same solution.

# Example 1. Let $y = \sqrt{\log_2 3 \cdot \log_2 12 \cdot \log_2 48 \cdot \log_2 192 + 16}$ $-\frac{1}{2}\log_2 12.\log_2 48 + 10.$

# **Base Change Theorem**

$$\int \log_b a = \frac{\log_c a}{\log_c b}$$

N

# **Base Change Theorem**

$$\log_b a = \frac{\log_c a}{\log_c b}$$

$$a^{\log_b x} = x^{\log_b a}$$

1. If  $(\log_2 3)(\log_3 4)(\log_4 5)...(\log_n(n+1))=10$ , find n

1. If  $(\log_2 3)(\log_3 4)(\log_4 5)...(\log_n(n+1))=10$ , find n

2. 
$$7^{\log_3 5} + 3^{\log_5 7} - 5^{\log_3 7} - 7^{\log_5 3} = ?$$

1. If  $(\log_2 3)(\log_3 4)(\log_4 5)...(\log_n(n+1))=10$ , find n

2. 
$$7^{\log_3 5} + 3^{\log_5 7} - 5^{\log_3 7} - 7^{\log_5 3} = ?$$

3. Prove that  $\log_2 7$  is irrational

If log<sub>a</sub>x=b for permissible values of a and x then
which of the following may be correct :
(A) If a rational and b rational then x can be rational.

If  $\log_a x = b$  for permissible values of a and x then which of the following may be correct :

- (A) If a rational and b rational then x can be rational.
- (B) If a irrational and b rational then x can be rational.

If  $\log_a x = b$  for permissible values of a and x then which of the following may be correct :

- (A) If a rational and b rational then x can be rational.
- (B) If a irrational and b rational then x can be rational.
- (C) If a rational and b irrational then x can be rational.

If  $\log_a x = b$  for permissible values of a and x then which of the following may be correct :

- (A) If a rational and b rational then x can be rational.
- (B) If a irrational and b rational then x can be rational.
- (C) If a rational and b irrational then x can be rational.
- (D) If a and b are two irrational numbers then x can be rational.

Number of solutions of  $\log_4(x-1) = \log_2(x-3)$  is

(a) 3 (b) 1

(c) 2 (d) 0

[JEE 2001, (Screening)]

# Trichotomy

#### True / False

•  $\log_3 5 > \log_{17} 25$ 

## For A Non Negative Number

$$\sqrt[n]{a} = a^{1/n}$$

#### For A Non Negative Number



#### 'a' & $N \ge 2, n \in N$

# **Logrithmic Equations**

• Solve for 'x' 
$$2\log_2 \frac{x-7}{x-1} + \log_2 \frac{x-1}{x+1} = 1$$

### **Logrithmic Equations**

• Solve for 'x' 
$$2\log_2 \frac{x-7}{x-1} + \log_2 \frac{x-1}{x+1} = 1$$

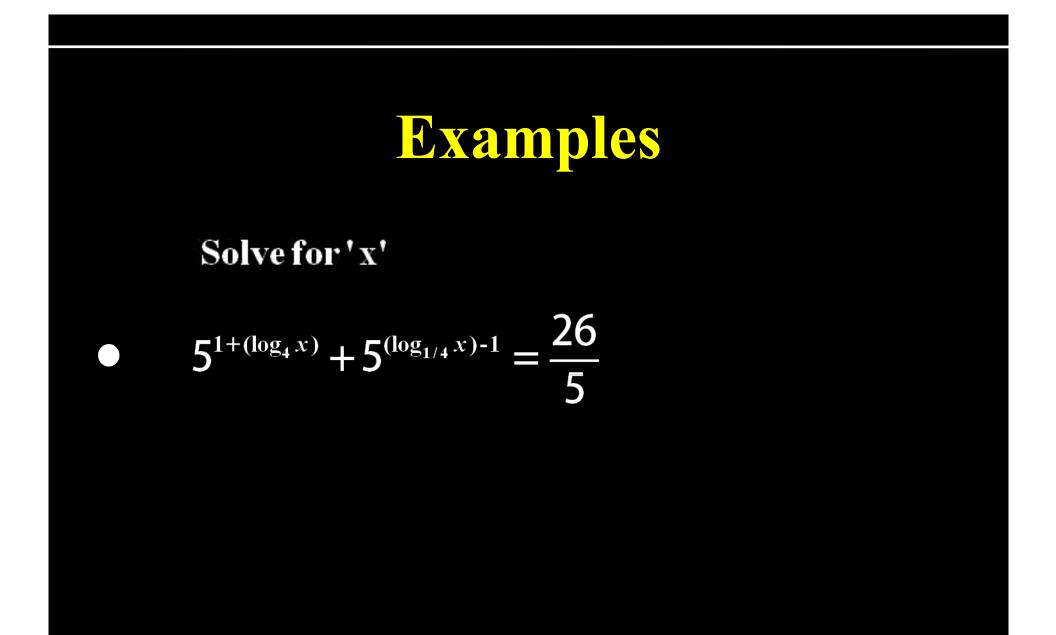
• Solve for'x'  $\log_5(5^{1/x} + 125) - \log_5(6) = 1 + \frac{1}{2x}$ 

## **Logrithmic Equations**

• Solve for 'x' 
$$2\log_2 \frac{x-7}{x-1} + \log_2 \frac{x-1}{x+1} = 1$$

• Solve for'x' 
$$\log_5(5^{1/x} + 125) - \log_5(6) = 1 + \frac{1}{2x}$$

• Solve for 'x'  $\log_5(\sqrt[x]{5}+125) - \log_5(6) = 1 + \frac{1}{2x}$ 





$$3^{\log_3^2 x} + x^{\log_3 x} = 162$$

• Solve for x

$$3^{\log_3^2 x} + x^{\log_3 x} = 162$$

• Solve for x

 $(x+1)^{\log_{10}(x+1)} = 100(x+1)$ 

Let  $(x_0, y_0)$  the solution of the following equations  $(2x)^{ln2} = (3y)^{ln3}$  $3^{ln}x = 2^{lny}$ . Then  $x_0$  is (A)  $\frac{1}{6}$  (B)  $\frac{1}{3}$  (C)  $\frac{1}{2}$ (D) 6 [JEE 2011,3] Common and Natural Logarithm

#### Characteristic & Mantissa

• Standard form of a positive number

Using log 2 = 0.3010 and log 3 = 0.4771, and log 7 = 0.8451

(1) Find the number of digits (A)  $6^{50}$  (B)  $5^{25}$ 

Using log 2 = 0.3010 and log 3 = 0.4771, and log 7 = 0.8451

- (1) Find the number of digits (A)  $6^{50}$  (B)  $5^{25}$
- (2) Find the number of zeros after decimal before a significant figure start in

(A) 
$$\left(\frac{9}{8}\right)^{-100}$$
 (B)  $3^{-50}$ 

Let  $\log_3 N = \alpha_1 + \beta_1$ ;  $\log_5 N = \alpha_2 + \beta_2$ ;  $\log_7 N = \alpha_3 + \beta_3$ where  $\alpha_1, \alpha_2, \alpha_3$  are integers and  $\beta_1, \beta_2, \beta_3 \in [0, 1)$ 

Let  $\log_3 N = \alpha_1 + \beta_1$ ;  $\log_5 N = \alpha_2 + \beta_2$ ;  $\log_7 N = \alpha_3 + \beta_3$ where  $\alpha_1, \alpha_2, \alpha_3$  are integers and  $\beta_1, \beta_2, \beta_3 \in [0, 1)$ 

(i) Find the number of integral and  $\alpha_1 = 4$  and  $\alpha_2 = 2$ 

Let  $\log_3 N = \alpha_1 + \beta_1$ ;  $\log_5 N = \alpha_2 + \beta_2$ ;  $\log_7 N = \alpha_3 + \beta_3$ where  $\alpha_1, \alpha_2, \alpha_3$  are integers and  $\beta_1, \beta_2, \beta_3 \in [0, 1)$ 

(i) Find the number of integral and  $\alpha_1 = 4$  and  $\alpha_2 = 2$ 

(ii) Find the largest integral value of N if  $\alpha_1 = 5$ ,  $\alpha_2 = 3$  and  $\alpha_3 = 2$ 

Let  $\log_3 N = \alpha_1 + \beta_1$ ;  $\log_5 N = \alpha_2 + \beta_2$ ;  $\log_7 N = \alpha_3 + \beta_3$ where  $\alpha_1, \alpha_2, \alpha_3$  are integers and  $\beta_1, \beta_2, \beta_3 \in [0, 1)$ 

(i) Find the number of integral and  $\alpha_1 = 4$  and  $\alpha_2 = 2$ 

(ii) Find the largest integral value of N if  $\alpha_1 = 5$ ,  $\alpha_2 = 3$  and  $\alpha_3 = 2$ 

(iii) Find the difference of largest and smallest integral values of N if

 $\alpha_1 = 5, \ \alpha_2 = 3 \text{ and } \alpha_3 = 2$ 

# Modulus (Absolute Value Function)

Solve for *x* 

(a) |x-1|+|x-3|=5

- (a) |x-1|+|x-3|=5
- (b) |x| |x 2| = 2

- (a) |x-1|+|x-3|=5
- (b) |x| |x 2| = 2
- (c) |x+1|+|x+2|=2

- (a) |x-1|+|x-3|=5
- (b) |x| |x-2| = 2
- (c) |x+1|+|x+2|=2
- (d) |3x-2|+x=11

#### Solve for *x*

- (a) |x-1|+|x-3|=5
- (b) |x| |x 2| = 2
- (c) |x+1|+|x+2|=2

(d) |3x-2|+x=11

(e) 
$$|x-2|^{10x^2-1} = |x-2|^{3x}$$

• Least value of x satisfying |x-3|+2|x+1|=4

• Least value of x satisfying |x-3|+2|x+1|=4

• If the sum of all solutions of the equation

$$(x^{\log_{10} 3}) - (3^{\log_{10} x}) - 2 = 0$$
 is  $(a^{\log_{b} c})$ 

where *b* and *c* are relatively prime and a, b,  $c \in N$ . Find the value of (a + b + c)

• 
$$\log_4(x^2 - 1) - \log_4(x - 1)^2 = \log_4\sqrt{(4 - x)^2}$$

$$\log_4 (x^2 - 1) - \log_4 (x - 1)^2 = \log_4 \sqrt{(4 - x)^2}$$

$$2\log_8(2x) + \log_8(x^2 + 1 - 2x) = \frac{4}{3}$$

#### Solve for 'x'

$$\log_4 (x^2 - 1) - \log_4 (x - 1)^2 = \log_4 \sqrt{(4 - x)^2}$$

$$2\log_8(2x) + \log_8(x^2 + 1 - 2x) = \frac{4}{3}$$

•  $\frac{3}{2}\log_4(x+2)^2 + 3 = \log_4(4-x)^3 + \log_4(6+x)^3$ .

• 
$$|x-3|^{3x^2-10x+3} = 1$$

- $|x-3|^{3x^2-10x+3} = 1$
- $2\log_3(x-2) + \log_3(x-4)^2 = 0$

• 
$$|x-3|^{3x^2-10x+3} = 1$$

• 
$$2\log_3(x-2) + \log_3(x-4)^2 = 0$$

• 
$$|x-1|^{\log_3 x^2 - 2\log_x 9} = (x-1)^7$$

• 
$$|x-3|^{3x^2-10x+3} = 1$$

• 
$$2\log_3(x-2) + \log_3(x-4)^2 = 0$$

• 
$$|x-1|^{\log_3 x^2 - 2\log_x 9} = (x-1)^7$$
  
•  $x^{(3/4)(\log_2 x)^2 + \log_2 x - (5/4)} = \sqrt{2}$ 

# Log. Inequalities

# Log. Inequalities

● For a >1 the inequality 0 < x < y & log, x < log, y are equivalent

# Log. Inequalities

● For a >1 the inequality 0 < x < y & log<sub>a</sub> x < log<sub>a</sub> y are equivalent

• For 0 < a < 1 the inequality  $0 < x < y \& \log_a x > \log_a y$  are equivalent

# Assignment

### Prilepko (Page No.92-93)

Solve the following equations :

#### $\log_{x-1} 3 = 2$

Solve the following equations :

•  $\log_{x-1} 3 = 2$ 

$$\log_4 \left( 2 \log_3 \left( 1 + \log_2 \left( 1 + 3 \log_3 x \right) \right) \right) = \frac{1}{2}$$

Solve the following equations :

•  $\log_{x-1} 3 = 2$ 

$$\log_4 \left( 2 \log_3 \left( 1 + \log_2 \left( 1 + 3 \log_3 x \right) \right) \right) = \frac{1}{2}$$

• 
$$\log_3(1 + \log_3(2^x - 7)) = 1$$

Solve the following equations :

•  $\log_{x-1} 3 = 2$ 

$$\log_4 \left( 2 \log_3 \left( 1 + \log_2 \left( 1 + 3 \log_3 x \right) \right) \right) = \frac{1}{2}$$

• 
$$\log_3(1 + \log_3(2^x - 7)) = 1$$

$$\log_3\left(3^{\mathrm{x}}-8\right)=2-\mathrm{x}$$

$$\frac{\log_2(9-2^x)}{3-x} = 1$$

$$\frac{\log_2(9-2^x)}{3-x} = 1$$

• 
$$\log_{5-x}(x^2 - 2x + 65) = 2$$

• 
$$\frac{\log_2(9-2^x)}{3-x} = 1$$
  
•  $\log_{5-x}(x^2-2x+65) = 2$   
•  $\log_{5-x}(\log_9x+\frac{1}{2}+9^x) = 2x$ 

• 
$$\frac{\log_2(9-2^x)}{3-x} = 1$$
  
•  $\log_{5-x}(x^2-2x+65) = 2$   
•  $\log_3\left(\log_9x+\frac{1}{2}+9^x\right) = 2x$   
•  $\log_3(x+1) + \log_3(x+3) = 1$ 

• 
$$\log_7(2^x - 1) + \log_7(2^x - 7) = 1$$

• 
$$\log_7(2^x - 1) + \log_7(2^x - 7) = 1$$

• 
$$\log 5 + \log(x+10) - 1 = \log(21x-20) - \log(2x-1)$$

• 
$$\log_7(2^x - 1) + \log_7(2^x - 7) = 1$$

$$\log 5 + \log(x+10) - 1 = \log(21x-20) - \log(2x-1)$$

• 
$$1 - \log 5 = \frac{1}{3} \left( \log \frac{1}{2} + \log x + \frac{1}{3} \log 5 \right)$$

• 
$$\log_7(2^x - 1) + \log_7(2^x - 7) = 1$$

$$\log 5 + \log(x+10) - 1 = \log(21x-20) - \log(2x-1)$$

• 
$$1 - \log 5 = \frac{1}{3} \left( \log \frac{1}{2} + \log x + \frac{1}{3} \log 5 \right)$$
  
•  $\log x - \frac{1}{2} \log \left( x - \frac{1}{2} \right) = \log \left( x + \frac{1}{2} \right) - \frac{1}{2} \log \left( x + \frac{1}{8} \right)$ 

• 
$$9^{\log_3(1-2x)} = 5x^2 - 5$$

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• 
$$x^{1+\log x} = 10 x$$

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• 
$$x^{2\log x} = 10 x^2$$

• 
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$$x^{1+\log x} = 10 x$$

$$x^{2\log x} = 10 x^2$$

$$x^{\frac{\log x+5}{3}} = 10^{5+\log x}$$

• 
$$x^{\log_3 x} = 9$$

• 
$$x^{\log_3 x} = 9$$
  
•  $(\sqrt{x})^{\log_5 x - 1} = 5$ 

• 
$$x^{\log_3 x} = 9$$
  
•  $(\sqrt{x})^{\log_5 x-1} = 5$   
•  $x^{\log_x +1} = 10^6$ 

• 
$$x^{\log_3 x} = 9$$
  
•  $(\sqrt{x})^{\log_5 x-1} = 5$   
•  $x^{\log x+1} = 10^6$   
•  $\frac{\log x+7}{4} = 10^{\log x+1}$ 

• 
$$x^{\log_{\sqrt{x}}(x-2)} = 9$$

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•  $\left(\frac{\log x}{2}\right)^{\log^2 x + \log x^2 - 2} = \log \sqrt{x}$ 

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$$x^{\log_{\sqrt{x}}(x-2)} = 9$$
  
•  $\left(\frac{\log x}{2}\right)^{\log^2 x + \log x^2 - 2} = \log \sqrt{x}$   
•  $3\sqrt{\log_2 x} - \log_2 8x + 1 = 0$   
•  $\log^2 x - 3\log x = \log(x^2) - 4$ 

• 
$$\log_{1/3} x - 3\sqrt{\log_{1/3} x} + 2 = 0$$

$$\log_{1/3} x - 3\sqrt{\log_{1/3} x} + 2 = 0$$

• 
$$2\left(\log_x \sqrt{5}\right)^2 - 3\log_x \sqrt{5} + 1 = 0$$

$$\log_{1/3} x - 3\sqrt{\log_{1/3} x} + 2 = 0$$

• 
$$\sqrt{2}(\log_x \sqrt{5})^2 - 3\log_x \sqrt{5} + 1 = 0$$

• 
$$\log_2^2 x + 2 \log_2 \sqrt{x} - 2 = 0$$

0

• 
$$\log_{1/3} x - 3\sqrt{\log_{1/3} x} + 2 = 0$$
  
•  $(2(\log_x \sqrt{5})^2 - 3\log_x \sqrt{5} + 1 = 0)$   
•  $\log_2^2 x + 2\log_2 \sqrt{x} - 2 = 0$   
•  $(a^{\log_b x})^2 - 5x^{\log_b a} + 6 = 0$ 

• 
$$\log^2(100 \text{ x}) + \log^2(10 \text{ x}) = 14 + \log\left(\frac{1}{\text{x}}\right)$$

• 
$$\log^2(100 \text{ x}) + \log^2(10 \text{ x}) = 14 + \log\left(\frac{1}{\text{x}}\right)$$

• 
$$\log_4(x+3) - \log_4(x-1) = 2 - \log_4 8$$

• 
$$\log^2(100 \text{ x}) + \log^2(10 \text{ x}) = 14 + \log\left(\frac{1}{\text{x}}\right)$$

• 
$$\log_4(x+3) - \log_4(x-1) = 2 - \log_4 8$$

• 
$$2\log_4(4-x) = 4 - \log_2(-2-x)$$

#### **Solve Sheet**

#### **To Attain IIT-Level**