

# Lecture 11

Friday, April 21, 2023 2:40 PM

\* Questions.

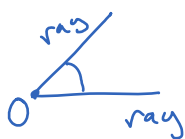
$$x \ln x - x > 0 \Leftrightarrow x \underbrace{(\ln x - 1)} > 0$$

$= 0 \text{ if } x = e$

$x$	$0$	$e$	
$x$	-	0	+
$\ln x - 1$	////		- 0 +
$x(\ln x - 1)$	////		- 0 +

Conclusion  $x \in (e, \infty)$

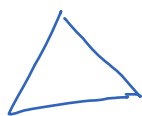
Trigonometry : started as a study about measurement on a triangle.  
triangle measure



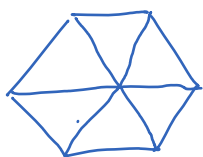
measurement of angles

- DMS: degree, minute, second
- radian:  $1 \text{ rad} = 180^\circ$
- gradian:  $1 \text{ grad} = \left(\frac{1}{100}\right)^\circ$

A full cycle is  $360^\circ$ . Historically, the Babylonian used the hexagonal system (system of 60).



equilateral triangle is considered perfect and each angle is considered as  $60^\circ$  (like we consider a perfect score as 10 or 100).



6 triangles put together gives a full cycle, so the full cycle is  $60^\circ \times 6 = 360^\circ$ .

$1^\circ$  is then broken into 60 pieces (like we break 1 into 10 pieces), each is called a minute. Then each minute is broken into 60 seconds.

An angle measurement can be written as a decimal degree (mixed between hexagonal and decimal system) or DMS.

$$\underline{\underline{\text{Ex}}}$$
$$45.1^\circ = 45^\circ + \left(\frac{1}{10}\right)^\circ = 45^\circ + 6' = 45^\circ 6'$$

$$1^\circ = 60'$$

$$\left(\frac{1}{10}\right)^\circ = 6'$$

Ex

$$30.29^\circ = 30^\circ + \left(\frac{29}{100}\right)^\circ$$

$$1^\circ = 60'$$

$$\left(\frac{29}{100}\right)^\circ = \left(\frac{29 \times 60}{100}\right)' = 17.4' = 17' + \left(\frac{4}{10}\right)'$$

$$1' = 60''$$

$$\left(\frac{4}{10}\right)' = \left(60 \times \frac{4}{10}\right)'' = 24''$$

Therefore,

$$30.29^\circ = 30^\circ + 17' + 24'' = 30^\circ 17' 24''$$

Ex

$$21^\circ 5' 13'' = 21^\circ + 5' + 13''$$

$$= 21^\circ + \left(\frac{5}{60}\right)^\circ + \left(\frac{13}{60}\right)'$$

$$= 21^\circ + \left(\frac{5}{60}\right)^\circ + \left(\frac{13}{360}\right)^\circ$$

$$= \left(21 + \frac{5}{60} + \frac{13}{360}\right)^\circ$$

$$\approx 22.119^\circ$$