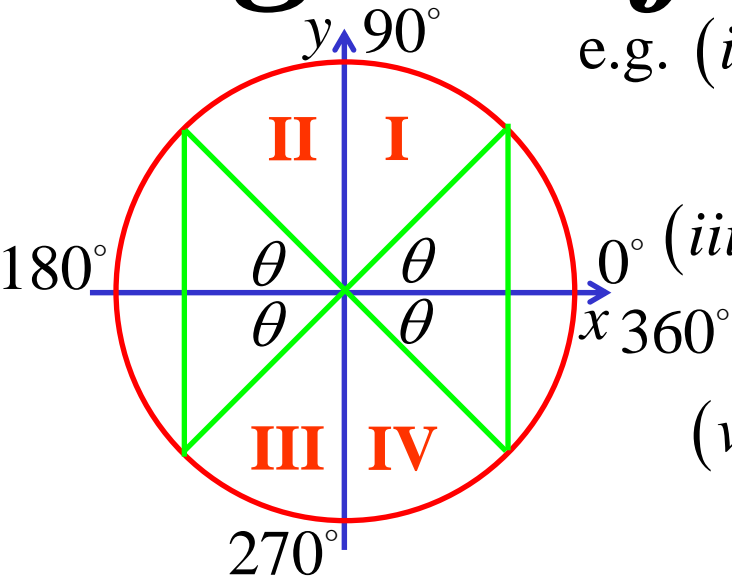


Angles of Any Magnitude



e.g. (i) $\sin 260^\circ = -\sin 80^\circ$
 $= \underline{-0.9848}$

(ii) $\tan 220^\circ = \tan 40^\circ$
 $= \underline{0.8391}$

(iii) $\sec 105^\circ = -\sec 75^\circ$
 $= \underline{-3.8637}$

(iv) $\cos 430^\circ = \cos 70^\circ$
 $= \underline{0.3420}$

(v) $\tan(-67^\circ) = \tan 293^\circ$
 $= -\tan 67^\circ$
 $= \underline{-2.3559}$

Quadrant I - normal

Quadrant II - $(180 - \theta)$

$$\sin = \frac{+}{-} = +$$

$$\cos = \frac{+}{-} = -$$

$$\tan = \frac{+}{-} = -$$

Quadrant III - $(180 + \theta)$

$$\sin = \frac{-}{-} = +$$

$$\cos = \frac{+}{-} = -$$

$$\tan = \frac{-}{-} = +$$

Quadrant IV - $(360 - \theta)$

$$\sin = \frac{-}{+} = -$$

$$\cos = \frac{+}{+} = +$$

$$\tan = \frac{-}{+} = -$$

(vi) Find the coordinates of P

$$\frac{x}{5} = \cos 30^\circ$$

$$\frac{y}{5} = \sin 30^\circ$$

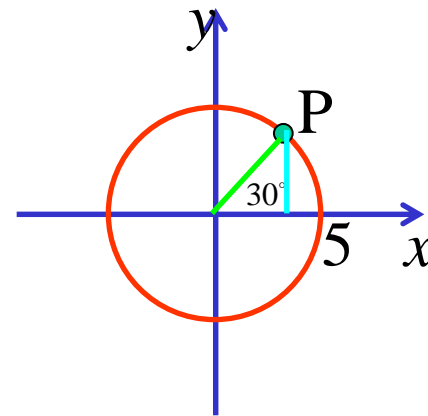
$$x = 5 \cos 30^\circ$$

$$y = 5 \sin 30^\circ$$

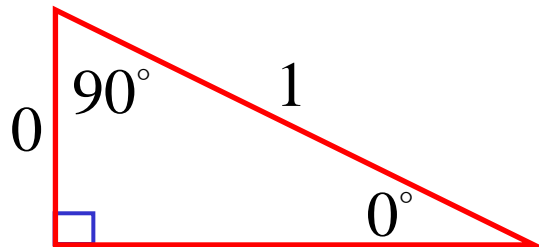
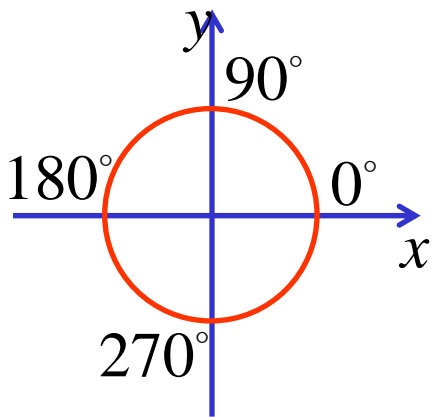
$$x = \frac{5\sqrt{3}}{2}$$

$$y = \frac{5}{2}$$

$$\therefore P\left(\frac{5\sqrt{3}}{2}, \frac{5}{2}\right)$$



Boundary Values



<u>0°</u>	1	<u>90°</u>
$\sin 0^\circ = 0$		$\sin 90^\circ = 1$
$\cos 0^\circ = 1$		$\cos 90^\circ = 0$
$\tan 0^\circ = 0$		$\tan 90^\circ = \frac{1}{0}$
		<i>undefined</i>

180°

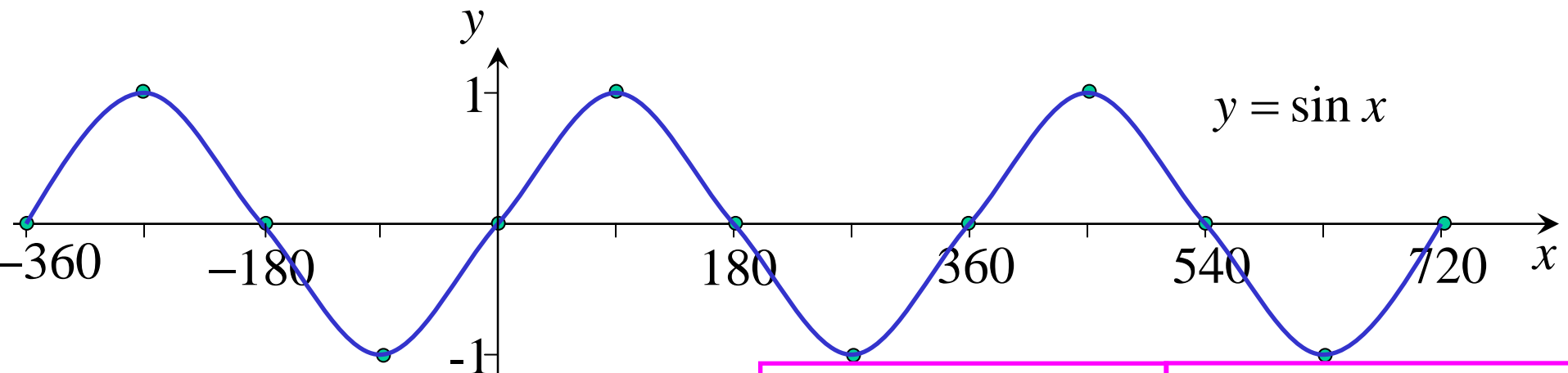
$\sin 180^\circ = 0$
$\cos 180^\circ = -1$
$\tan 180^\circ = 0$

270°

$\sin 270^\circ = -1$
$\cos 270^\circ = 0$
$\tan 270^\circ = \frac{-1}{0}$
<i>undefined</i>

Trigonometric Graphs

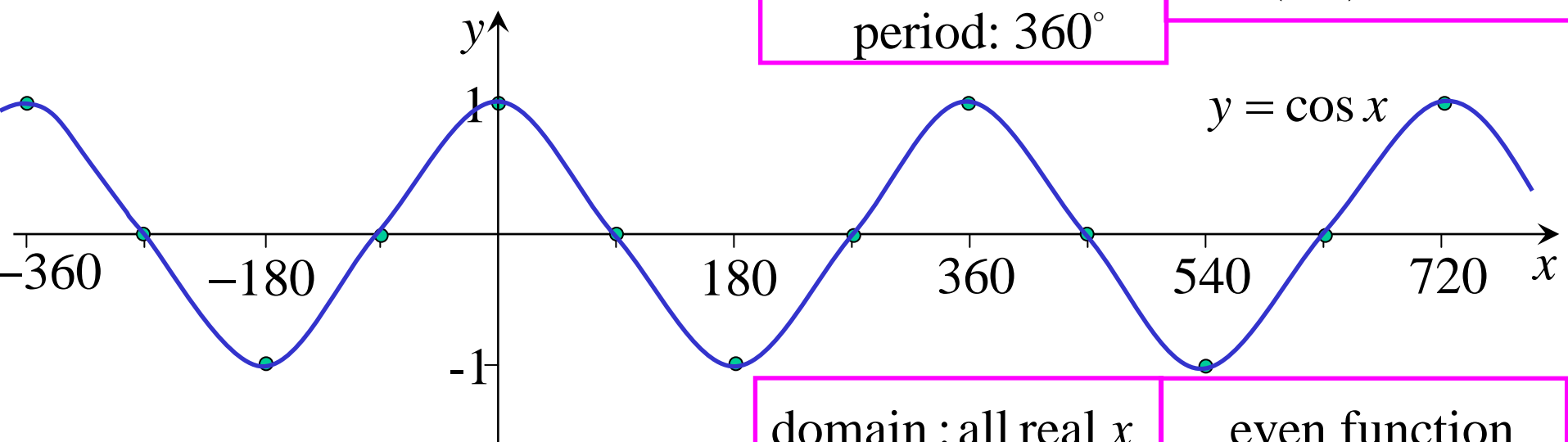
plot boundary values



$$y = \sin x$$

domain : all real x
range : $-1 \leq y \leq 1$
period: 360°

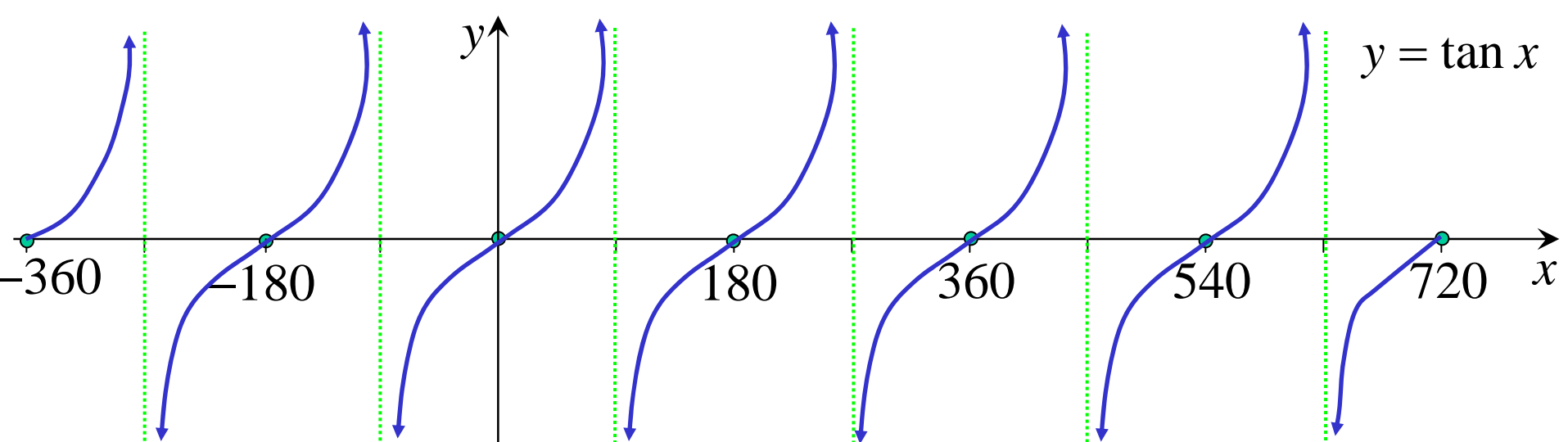
odd function
 $\sin(-x) = -\sin x$



$$y = \cos x$$

domain : all real x
range : $-1 \leq y \leq 1$
period: 360°

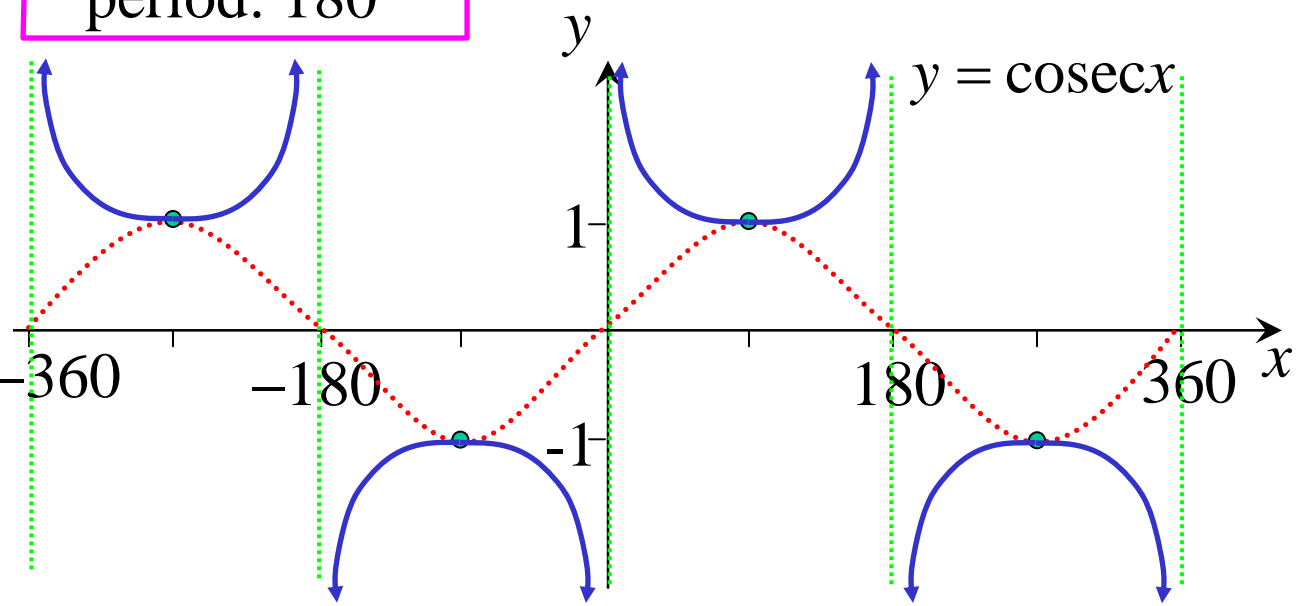
even function
 $\cos(-x) = \cos x$



domain: all real x except $x = 90 + 180k$, where k is an integer

range: all real y
 period: 180°

odd function
 $\tan(-x) = -\tan x$



**Exercise 4D; 3ace etc,
 4bdf etc, 5ace etc,
 6bdf, 7ace, 8b, 9bd,
 10bd, 11ac,
 13 ace etc, 14c, 16***