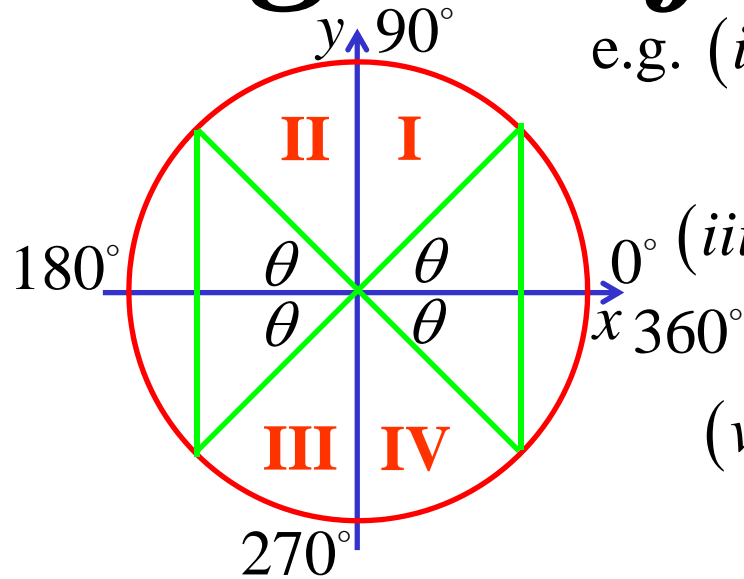


Angles of Any Magnitude



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

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

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

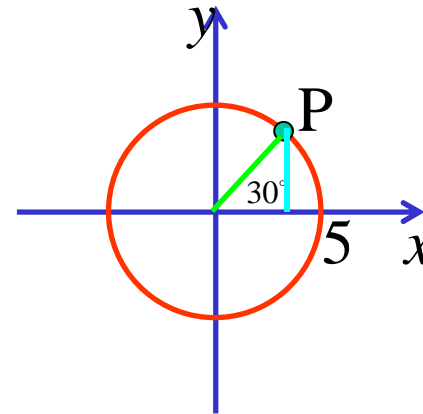
$$x = 5 \cos 30^\circ$$

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

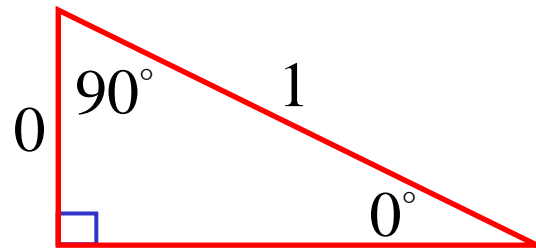
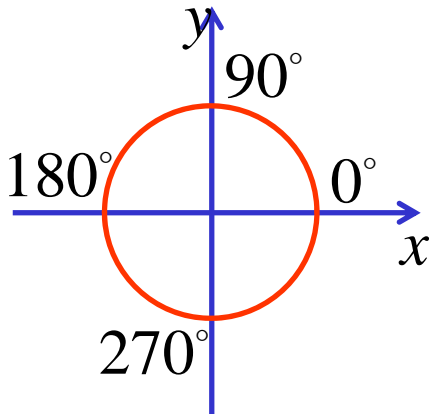
$$x = \frac{5\sqrt{3}}{2}$$

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

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



Boundary Values



$$\underline{0^\circ} \quad 1 \quad \underline{90^\circ}$$

$$\sin 0^\circ = 0 \quad \sin 90^\circ = 1$$

$$\cos 0^\circ = 1 \quad \cos 90^\circ = 0$$

$$\tan 0^\circ = 0 \quad \tan 90^\circ = \frac{1}{0}$$

undefined

$$\underline{180^\circ}$$

$$\sin 180^\circ = 0$$

$$\cos 180^\circ = -1$$

$$\tan 180^\circ = 0$$

$$\underline{270^\circ}$$

$$\sin 270^\circ = -1$$

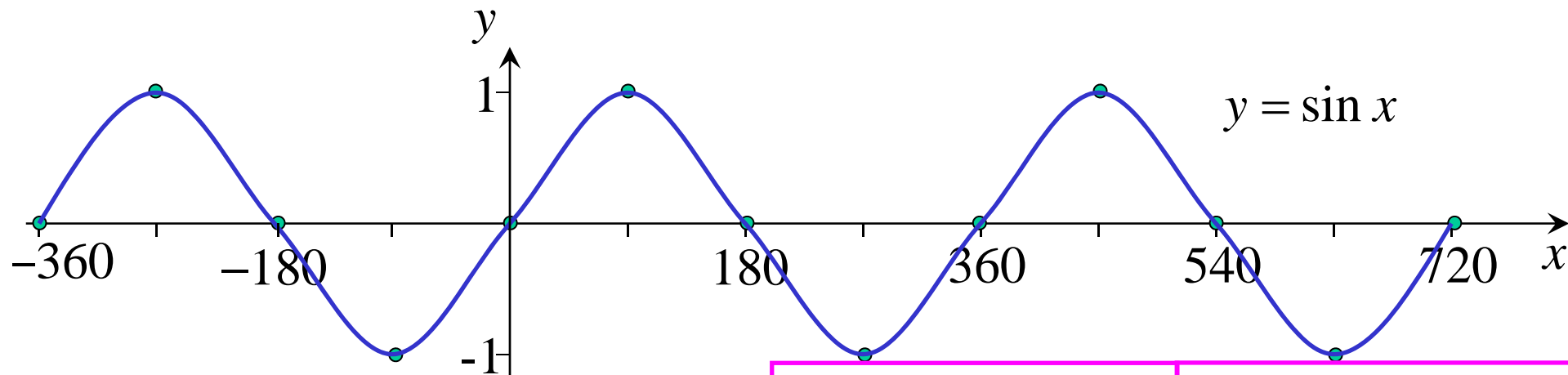
$$\cos 270^\circ = 0$$

$$\tan 270^\circ = \frac{-1}{0}$$

undefined

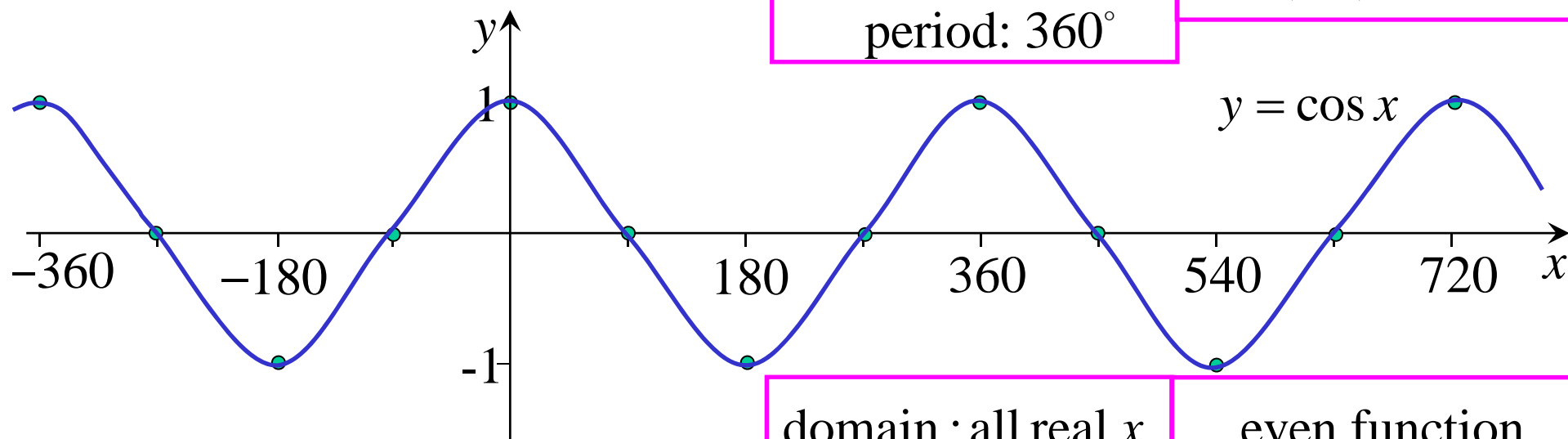
Trigonometric Graphs

plot boundary values



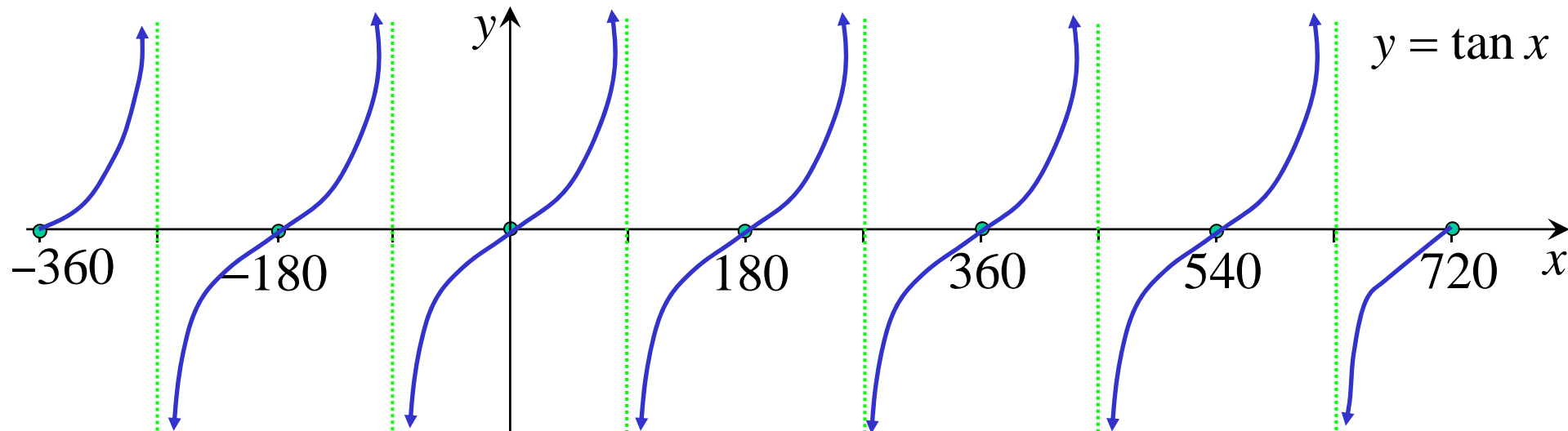
domain : all real x
range : $-1 \leq y \leq 1$
period: 360°

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



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

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



$y = \tan x$

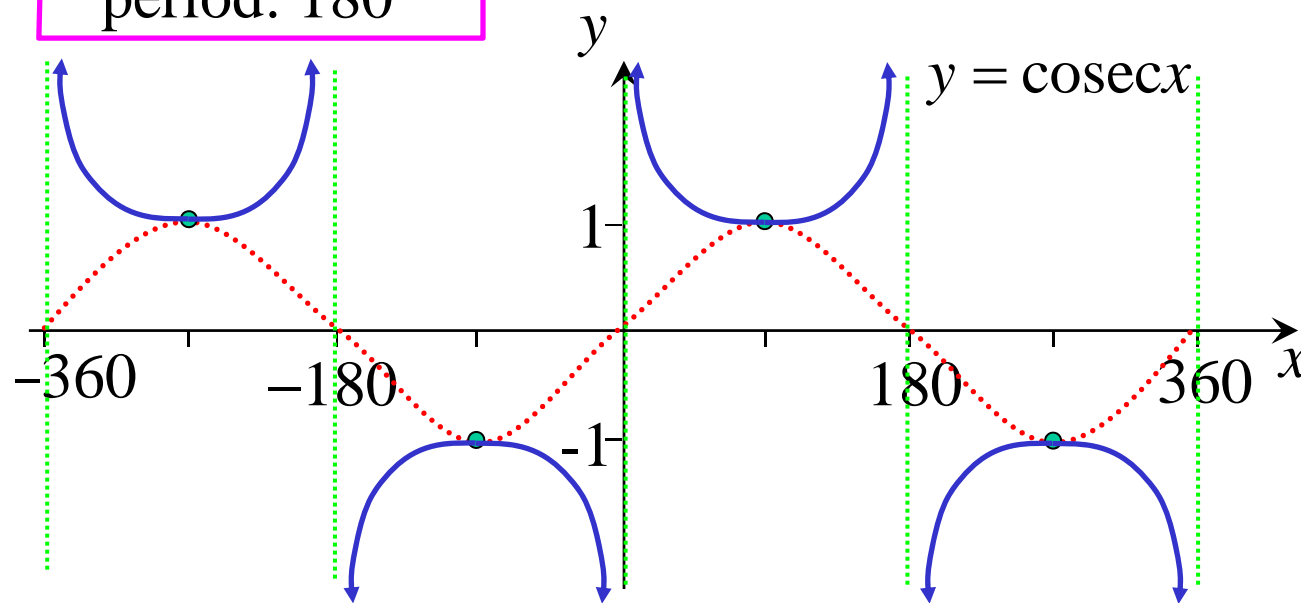
domain: all real x except $x = 90 + 180k$, where k is an integer

range: all real y

period: 180°

odd function

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



$y = \operatorname{cosec} x$

**Exercise 6D; 3ace,
4ace, 5, 6bd,
8a (i,iii,vii,ix), b(i,vi),c, 10**

**Exercise 6E; 3acegik,
4bdfhjl, 5acegik,
6acegik, 7ace, 8bdf,
9bdfh, 10acegik, 11bdf,
12ace, 15bd, 16bd, 18bc**