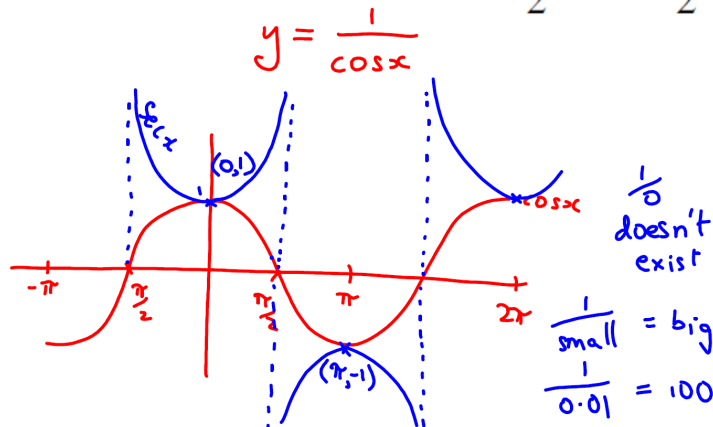


Trig graphs

Q1 Sketch the graph of $y = \sec x$ for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$



$y = \sec\left(x + \frac{\pi}{3}\right)$
 $\cos\left(x + \frac{\pi}{3}\right)$ *Beyoncé* *Do this curve then*

A wooden plinth for a statue can be modelled by the volume generated when the area bounded by the curve $y = \sec x$, the x -axis, the y -axis and the line $x = a$ ($0 < a < \frac{\pi}{2}$) is rotated through 2π radians about the x -axis.

(a) Find an expression for V , the volume of the plinth. [5]

(b) Find V if $a = \frac{\pi}{4}$ [1]

$$\text{Volume} = \pi \int_0^a y^2 dx$$

$$\text{Volume} = \pi \int_0^a \sec^2 x dx$$

$$= \pi \left[\tan x \right]_0^a - \left[\tan x \right]_0$$

$$= \pi (\tan a - \tan 0)$$

$$= \pi (\tan a - 0)$$

$$= \pi \tan a$$

Volume when $a = \frac{\pi}{4}$

$$\text{Volume} = \pi \cdot \tan\left(\frac{\pi}{4}\right)$$

$$= \pi$$



Q2

Sketch the graph of

$$y = \operatorname{cosec} x \quad \text{for } -\pi < x < \pi$$

[3]

Q2

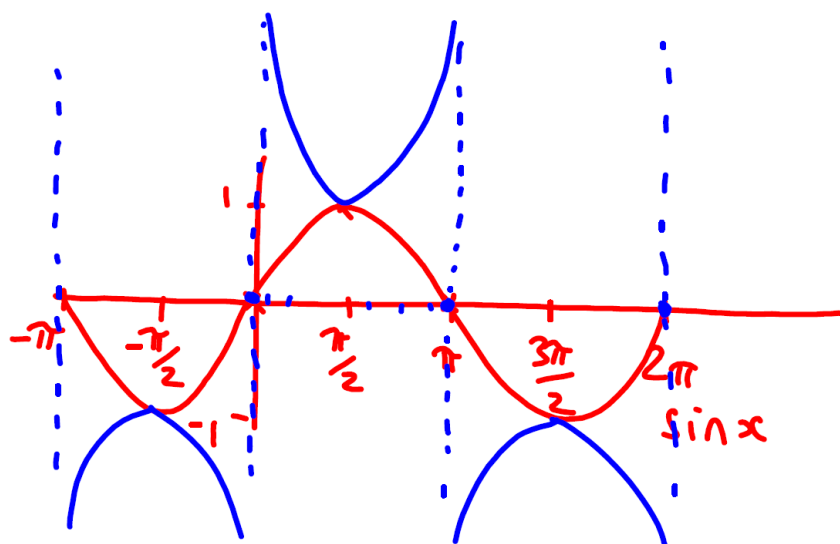
Sketch the graph of

$$y = \frac{1}{\sin x}$$

$$y = \operatorname{cosec} x \quad \text{for } -\pi < x < \pi$$

$$-180 < < +180$$

[3]



$$\frac{1}{\sin(90)} =$$

$$\frac{1}{\operatorname{cosec}(2x)}$$

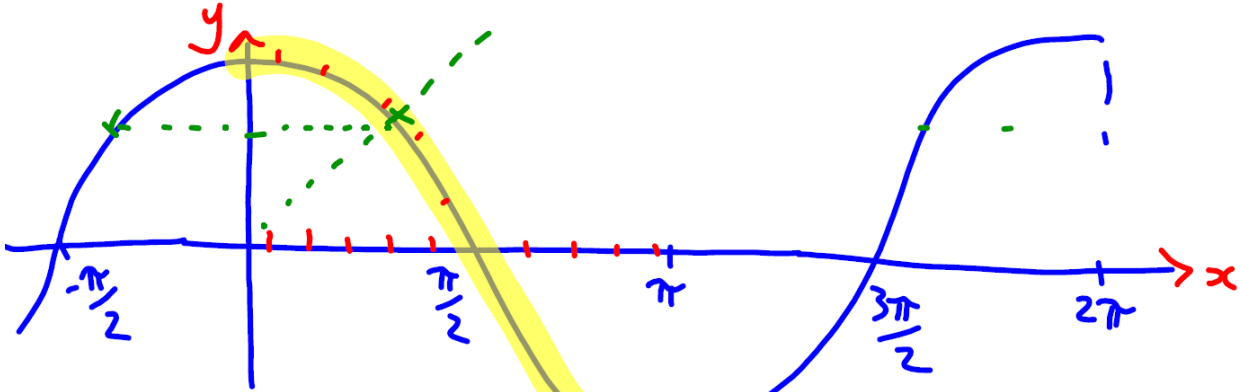
Q3

(i) Sketch the graph of $y = \cos x$ where $0 \leq x \leq \pi$

[2]

(ii) Hence sketch the graph of $y = \cos^{-1} x$ where $0 \leq y \leq \pi$

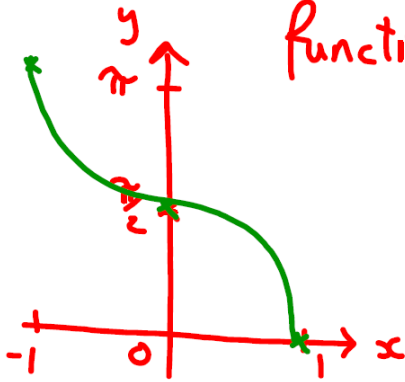
[3]



one-to-one
function

$$\cos^{-1}(0.7)$$

You need a
restricted domain
to get an
inverse



Q4

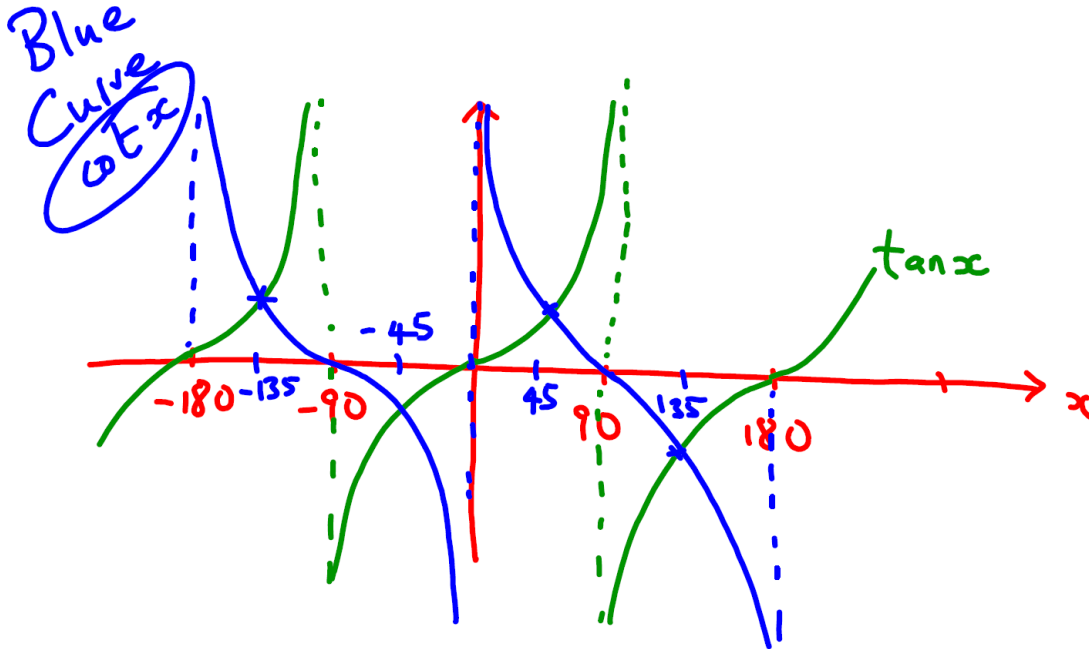
$$y = \frac{1}{\tan x}$$

$$\tan 45 = 1$$

Sketch the graph of

$$y = \cot x \quad \text{for } -180^\circ \leq x \leq 180^\circ$$

[2]



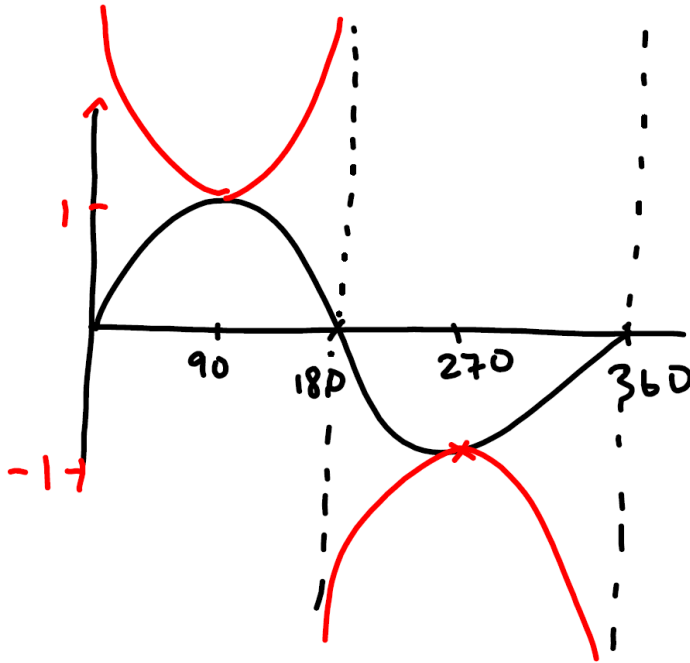
Q5

(i) Sketch the graph of $y = \sin x$ for $0^\circ \leq x \leq 360^\circ$

[2]

(ii) Hence sketch the graph of $y = \operatorname{cosec} x$ for $0^\circ \leq x \leq 360^\circ$

[3]



Black curve
 $y = \sin x$

Red curve
 $y = \frac{1}{\sin x}$

inverse function of sin

Q6

Sketch the graph of

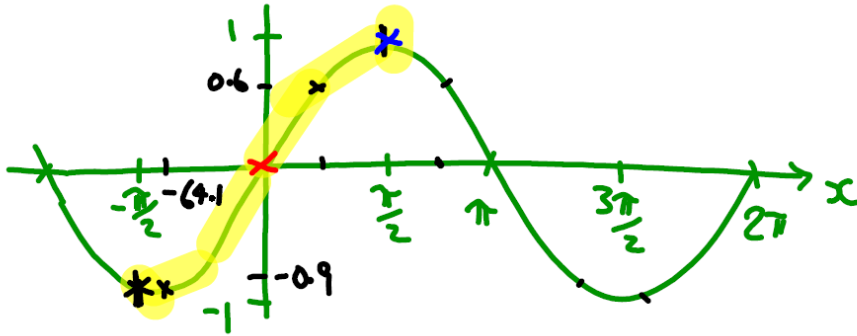
$$y = \sin^{-1} x$$

sometimes written $\arcsin(x)$

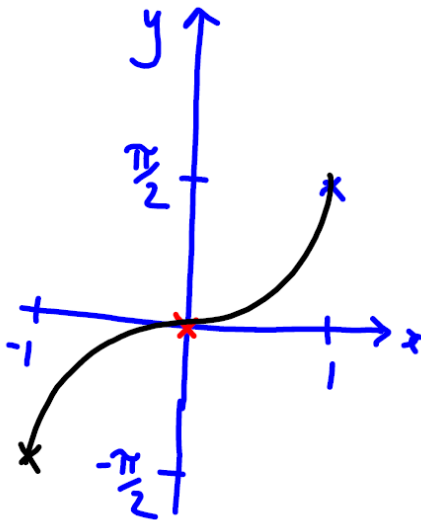
State the **restricted domain** of this function.

use calculator
 $\sin^{-1}(0.6)$

[3]



$\sin^{-1}(-0.9)$



Relationship
that takes you
back from sin \rightarrow angle