5.6 Additional Trigonometric Graphs

For tan, cot, sec, csc there is no notion of amplitude.

Consider the equation $\boxed{y = a \tan(bx+c)}$

⊛ period $= \frac{\pi}{|b|}$ since the period of $\tan x$ is π

⊛ phase shift $= -c/b$

⊛ Observe that successive vertical asymptotes for the graph of one branch may be found by solving the inequality:

$$-\pi/2 < bx + c < \pi/2$$

Similarly we can discuss the data attached to: $\boxed{y = a \cot(bx+c)}$

* Sketch $\frac{1}{3} \tan\left(2x - \pi/4\right)$

observe that the period is $\frac{\pi}{2}$ and

that the phase shift is $-\frac{-\pi/4}{2} = \frac{\pi}{8}$

Also observe that 2 successive vertical asymptotes for $y = \frac{1}{3}\tan(2x - \pi/4)$ are at the end points of the interval

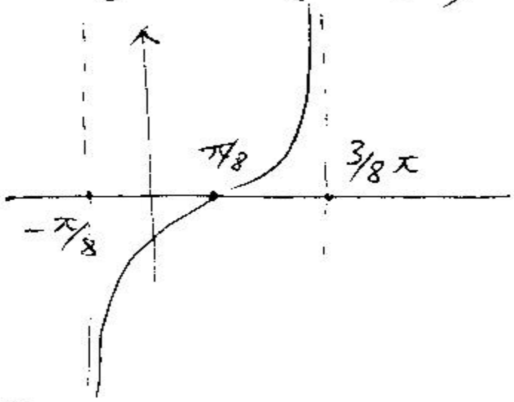
$$-\pi/2 < 2x - \pi/4 < \pi/2$$

$$\Longleftrightarrow$$

$$\pi/4 - \pi/2 < 2x < \pi/2 + \pi/4$$

$$\underbrace{-\frac{\pi}{8} < x < \frac{3\pi}{8}}$$

period is indeed amplitude of this interval
$= \frac{3}{8}\pi - (-\pi/8) = \frac{4\pi}{8} = \pi/2$



Find an equation using the cotangent that has the same graph as $y = \tan x$

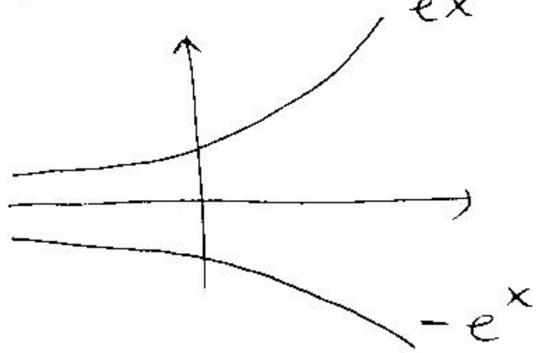
Ans: $y = -\cot(x + \pi/2)$

Sketch the graph of $y = e^x \sin x$

Observe that $-1 \le \sin x \le 1$, therefore

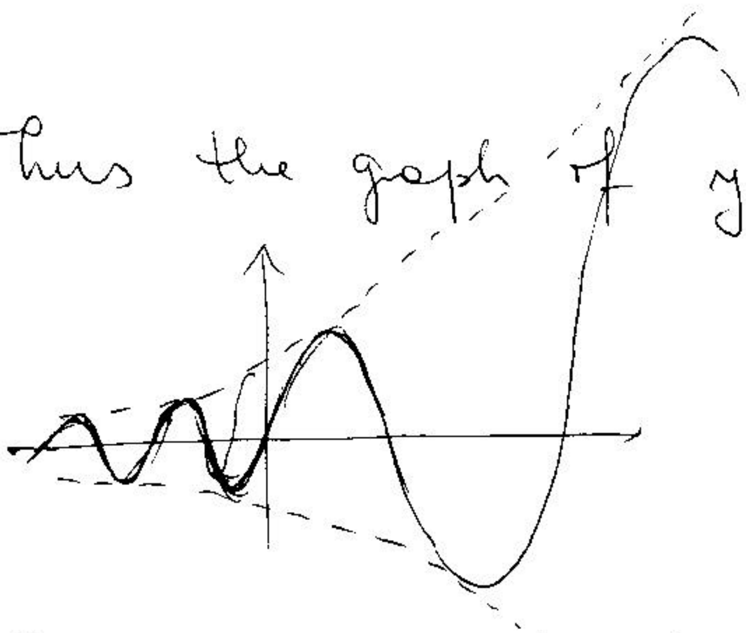
$$-e^x \le e^x \sin x \le e^x$$

Hence the graph of $e^x \sin x$ lies in between

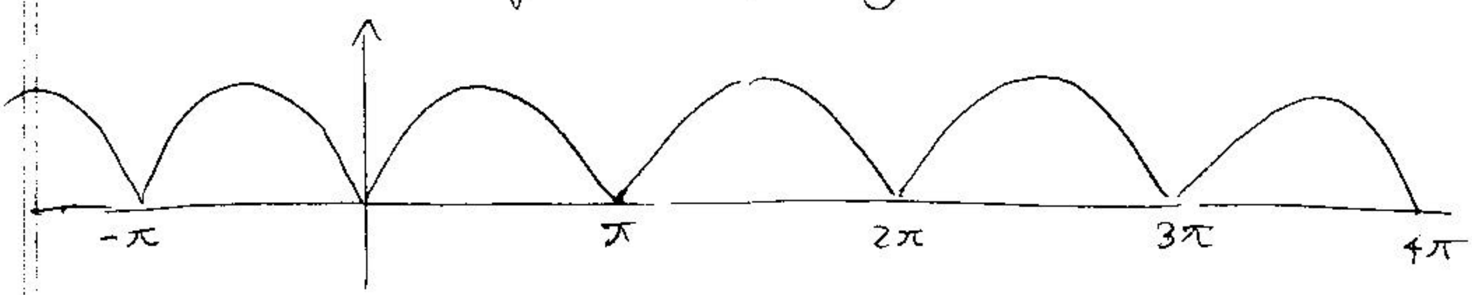


at the values of x such that $\sin x = 1$ or $\sin x = -1$ it also touches those 2 curves

Thus the graph of $y = e^x \sin x$ looks like



* Sketch the graph of $y = |\sin x|$



* Sketch the graph of $y = |x| \cos x$.