5. Graph **ONE** cycle of $f(x) = -2\sin\left(\frac{3}{4}x + \frac{\pi}{8}\right)$ Mark each important x-axis value.

a) Guide function $g(x) =$ $-2\sin\left(\frac{3}{4}x\right)$

Ampl: $= 2$ Reflected? yes

Freq $= \frac{3}{4}$ Period $= \frac{2\pi}{\frac{3}{4}} = \frac{8\pi}{3}$

b) Horizontal shift: (argument = 0)

$\frac{3}{4}x + \frac{\pi}{8} = 0$

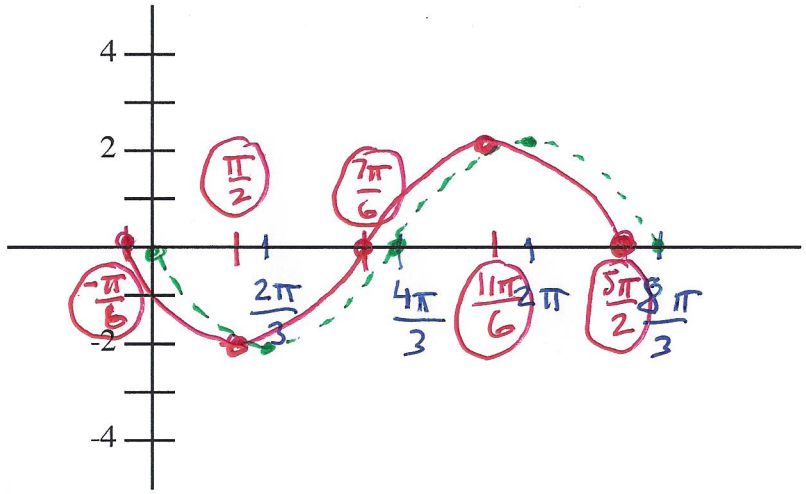
$\frac{4}{3} \cdot \frac{3}{4}x = -\frac{\pi}{8} \cdot \frac{4}{3}$

$x = \frac{-\pi}{6}$ (left)

c) Use this chart to identify the shifted x-values and draw the graph.

common denominator = 6

Feature	Original x	Shifted x
zero	$0 - \frac{\pi}{6} = -\frac{\pi}{6}$	
min	$\frac{4\pi}{6} - \frac{\pi}{6} = \frac{3\pi}{6} = \frac{\pi}{2}$	
zero	$\frac{8\pi}{6} - \frac{\pi}{6} = \frac{7\pi}{6}$	
max	$\frac{12\pi}{6} - \frac{\pi}{6} = \frac{11\pi}{6}$	
zero	$\frac{16\pi}{6} - \frac{\pi}{6} = \frac{15\pi}{6} = \frac{5\pi}{2}$	



the standard counting unit is $\frac{4\pi}{6}$ and the shift is $\frac{-\pi}{6}$; The shift distance is one-fourth of the s.c.u.

6. Graph **TWO** branches of $f(x) = -\tan\left(\frac{3}{4}x\right)$. Mark each important x-axis value.

The guideline graph, $g(x) = -\cos\left(\frac{3}{4}x\right)$, helps us find the asymptotes of $f(x)$.

For the guideline graph:

$g(x) = -\cos\left(\frac{3}{4}x\right)$

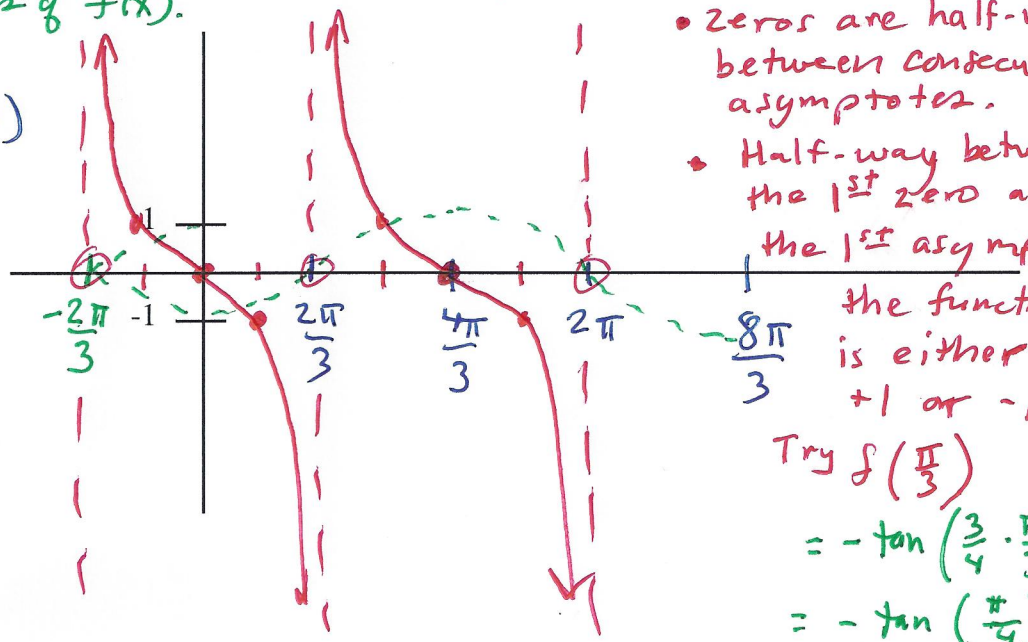
a) Ampl: 1

b) Refl:? yes

c) Freq: $\frac{3}{4}$

d) Per: (of $g(x)$)

$= \frac{2\pi}{\frac{3}{4}} = \frac{8\pi}{3}$



- zeros are half-way between consecutive asymptotes.
- Half-way between the 1st zero and the 1st asymptote, the function is either +1 or −1.

Try $f\left(\frac{\pi}{3}\right)$

$= -\tan\left(\frac{3}{4} \cdot \frac{\pi}{3}\right)$

$= -\tan\left(\frac{\pi}{4}\right) = -1$

7. Graph **TWO** branches of $f(x) = \cot\left(\frac{4}{5}x\right)$. Mark each important x-axis value.

For the guideline graph:

$g(x) = \sin\left(\frac{4}{5}x\right)$

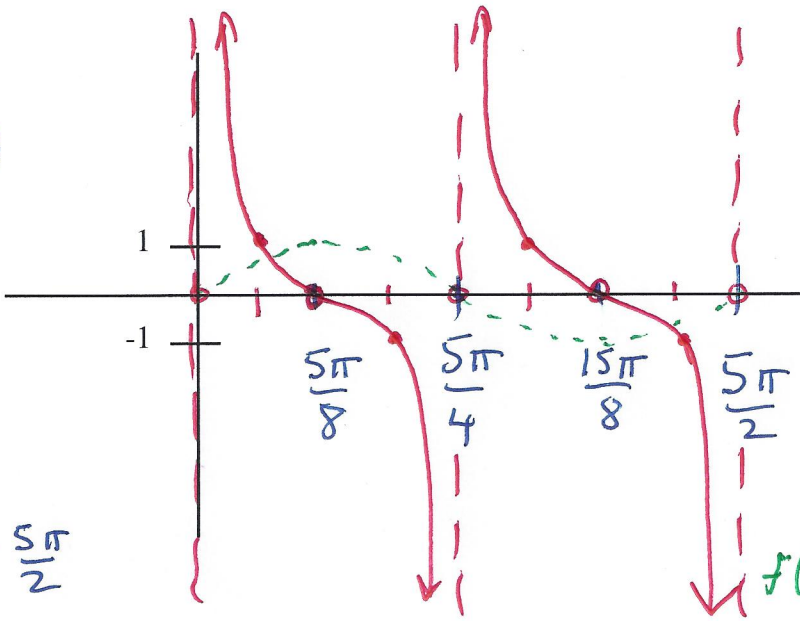
a) Ampl: 1

b) Refl:? no

c) Freq: $\frac{4}{5}$

d) Per: (of $g(x)$)

$= \frac{2\pi}{\frac{4}{5}} = \frac{10\pi}{4} = \frac{5\pi}{2}$



- Zeros are half-way between consecutive asymptotes.
- Also, half-way between 1st zero and 1st asymptote (y-axis) is $x = \frac{5\pi}{16}$:

$f\left(\frac{5\pi}{16}\right) = \cot\left(\frac{4}{5} \cdot \frac{5\pi}{16}\right)$

$= \cot(\pi/4) = +1$

8. Evaluate each.

a) sin (210°) $= \boxed{-\frac{1}{2}}$

$\hat{\theta} = 30°$

b) cos (-135°) $= \boxed{-\frac{\sqrt{2}}{2}}$

$\hat{\theta} = 45°$

c) sec (180°) $= \boxed{-1}$

d) cot (-120°) $= \boxed{+\frac{\sqrt{3}}{3}}$

$\hat{\theta} = 60°$

e) tan (495°) $= \boxed{-1}$

$\hat{\theta} = 45°$

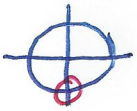
f) csc (390°) $= \boxed{+2}$

$\hat{\theta} = 30°$

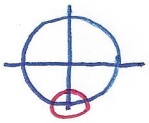
g) cos (300°) $= \boxed{+\frac{1}{2}}$

$\hat{\theta} = 60°$

h) sin (270°) $= \boxed{-1}$



i) tan (-90°) $\boxed{\text{undefined}}$

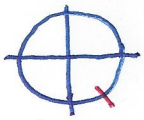


9. Evaluate each.

a) $\cot\left(\frac{11\pi}{6}\right) = \boxed{+\frac{\sqrt{3}}{2}}$

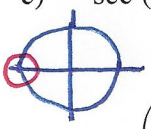
$\hat{\theta} = \frac{\pi}{6}$

b) $\sin\left(\frac{5\pi}{3}\right) = \boxed{-\frac{\sqrt{3}}{2}}$

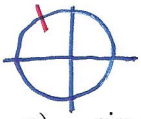


$\hat{\theta} = \pi/3$

c) sec $(3\pi) = \boxed{-1}$

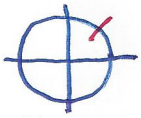


d) $\cos\left(-\frac{4\pi}{3}\right) = \boxed{-\frac{1}{2}}$



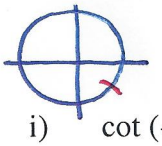
$\hat{\theta} = \pi/3$

e) $\csc\left(-\frac{7\pi}{4}\right) = \boxed{+\sqrt{2}}$



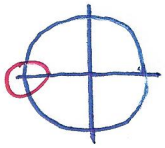
$\hat{\theta} = \pi/4$

f) $\tan\left(\frac{7\pi}{4}\right) = \boxed{-1}$

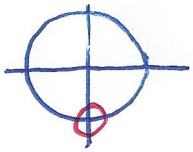


$\hat{\theta} = \frac{\pi}{4}$

g) sin $(5\pi) = \boxed{0}$



h) $\cos\left(\frac{7\pi}{2}\right) = \boxed{0}$



i) cot (-3π) $\boxed{\text{undef.}}$