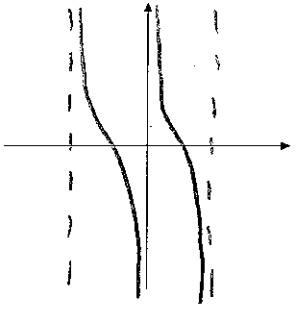
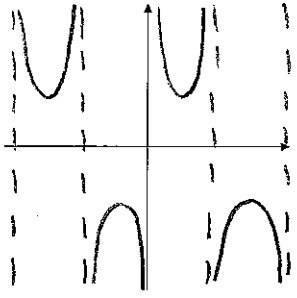
These questions are about the non-sinusoidal trigonometric functions. **SCORE: ____ / 8 PTS**

[a] Sketch 2 periods of the graphs of the following functions.
NOTE: You only need to get the general position and shape correct. Do NOT plot points.

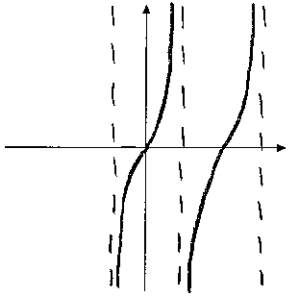
$y = \cot x$



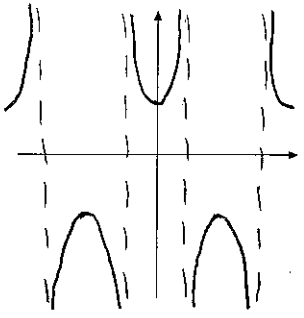
$y = \csc x$



$y = \tan x$



$y = \sec x$



[b] Fill in the blanks.

[1] The equations of the vertical asymptotes of $y = \sec x$ are $x = \frac{\pi}{2} + n\pi$; $n \in \mathbb{Z}$

[2] The domain of $y = \cot x$ is $x \neq n\pi$; $n \in \mathbb{Z}$

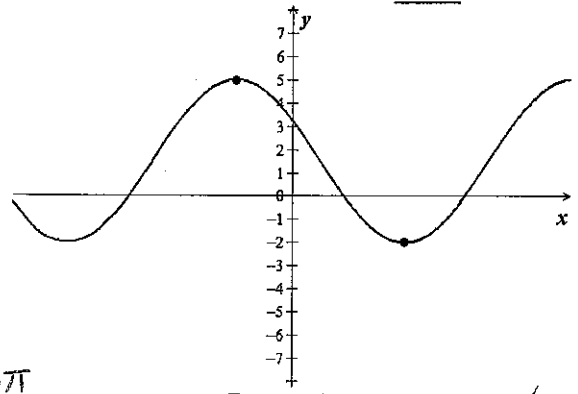
[3] As $x \to \frac{\pi}{2}^+$, $\tan x \to$ $-\infty$.

[4] As $x \to \pi^-$, $\csc x \to$ ∞.

Fill in the blanks regarding the graph on the right. Simplify your answers.

NOTE: The $x-$coordinates of the two points highlighted are $-\frac{2\pi}{5}$ and $\frac{4\pi}{5}$.

SCORE: _____ / 7 PTS



[a] Middle $y-$value = $\frac{3}{2}$ $\frac{5+(-2)}{2}$

[b] Amplitude = $\frac{7}{2}$ $\frac{5-(-2)}{2}$

[c] Phase shift = $\frac{-2\pi}{5}$

[d] Period = $\frac{12\pi}{5}$ $\frac{1}{2}P = \frac{4\pi}{5} - \frac{-2\pi}{5} = \frac{6\pi}{5}$

$\frac{2\pi}{B} = \frac{12\pi}{5} \rightarrow B = 2\pi \cdot \frac{5}{12\pi} = \frac{5}{6}$

[e] An equation of the graph is $y = \frac{7}{2}\cos\frac{5}{6}\left(x+\frac{2\pi}{5}\right)+\frac{3}{2}$.

Let $y = -3\sin(\frac{5\pi}{3}x + \frac{7\pi}{3}) - 4$.

SCORE: ____ / 15 PTS

[a] Fill in the blanks. Simplify your answers.

Middle $y-$value = -4

Maximum $y-$value = -1 $\quad -4+3$

Minimum $y-$value = -7 $\quad -4-3$

Amplitude = 3 $\quad |-3|$

Period = $\frac{6}{5}$ $\quad \frac{2\pi}{\frac{5\pi}{3}} = 2\pi \cdot \frac{3}{5\pi}$

Phase shift = $-\frac{7}{5}$ $\quad \frac{5\pi}{3}x + \frac{7\pi}{3} = 0$

$\frac{5\pi}{3}x = -\frac{7\pi}{3}$

$x = -\frac{7\pi}{3} \cdot \frac{3}{5\pi}$

[b] Find the coordinates for all points corresponding to the middle, top and bottom of the graph of the function for 2 complete cycles, starting at the phase shift. $\frac{1}{4}P = \frac{1}{4_2} \cdot \frac{63}{5} = \frac{3}{10}$

$-\frac{7}{5} = -\frac{14}{10}$

Point 1: ($\frac{-14}{10}$, -4)

Point 2: ($\frac{-11}{10}$, -7)

Point 3: ($\frac{-8}{10}$, -4)

Point 4: ($\frac{-5}{10}$, -1)

Point 5: ($\frac{-2}{10}$, -4)

Point 6: ($\frac{1}{10}$, -7)

Point 7: ($\frac{4}{10}$, -4)

Point 8: ($\frac{7}{10}$, -1)

Point 9: ($\frac{10}{10}$, -4)

[c] On the graph paper below, sketch a detailed graph of 2 complete cycles of the function using the information from [b]. You must label all $x-$ and $y-$ values from [b] on the appropriate axes below, and you must use a consistent scale for each axis.
You do NOT need to label each tick mark on each axis, only the ones you found in [b].

[d] Also on the graph paper below, sketch the graph of $y = -3\csc(\frac{5\pi}{3}x + \frac{7\pi}{3}) - 4$. DOTTED GRAPH BELOW