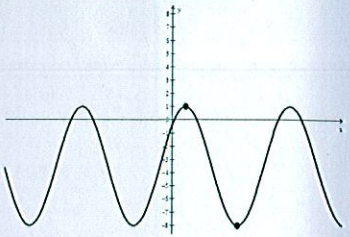
Fill in the blanks regarding the graph on the right. Simplify your answers.

NOTE: The $x-$coordinates of the two points highlighted are $\frac{\pi}{9}$ and $\frac{5\pi}{9}$.

SCORE: ____ / 7 PTS



[a] Middle $y-$value = $-\frac{7}{2}$ $\quad \frac{1+(-8)}{2}$

[b] Amplitude = $\frac{9}{2}$ $\quad \frac{1-(-8)}{2}$

[c] Phase shift = $\frac{\pi}{9}$

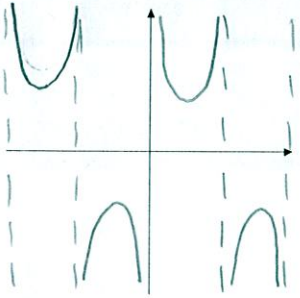
[d] Period = $\frac{8\pi}{9}$ $\quad \frac{1}{2}P = \frac{5\pi}{9} - \frac{\pi}{9} = \frac{4\pi}{9}$ $\quad \frac{2\pi}{B} = \frac{8\pi}{9} \rightarrow 18\pi = 8\pi B$ $\quad B = \frac{9}{4}$

[e] An equation of the graph is $y = \frac{9}{2}\cos\frac{9}{4}\left(x-\frac{\pi}{9}\right)-\frac{7}{2}$ OR $\frac{9}{2}\cos\left(\frac{9}{4}x-\frac{\pi}{4}\right)-\frac{7}{2}$

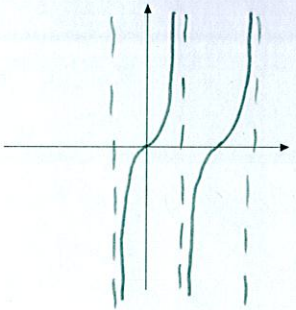
These questions are about the non-sinusoidal trigonometric functions. **SCORE: ____ / 8 PTS**

[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.

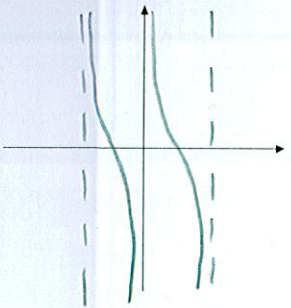
$y = \csc x$



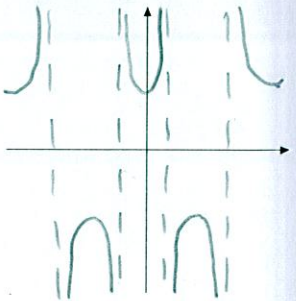
$y = \tan x$



$y = \cot x$



$y = \sec x$



[b] Fill in the blanks.

[1] The equations of the vertical asymptotes of $y = \csc x$ are $x = n\pi$.

[2] The domain of $y = \tan x$ is $x \neq \frac{\pi}{2} + n\pi$.

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

[4] As $x \to \pi^-$, $\cot x \to -\infty$.

Let $y = -2\sin(\frac{\pi}{6}x + \frac{7\pi}{3}) + 5$.

SCORE: ____ / 15 PTS

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

Middle $y-$value = 5

Amplitude = 2

Maximum $y-$value = 7 (5+2)

Period = 12

Minimum $y-$value = 3 (5-2)

Phase shift = -14

$|-2|$

$\frac{2\pi}{\frac{\pi}{6}} = 2\pi \cdot \frac{6}{\pi}$

$\frac{\pi}{6}x + \frac{7\pi}{3} = 0$

$\frac{\pi}{6}x = -\frac{7\pi}{3}$

$x = -\frac{7\pi}{3} \cdot \frac{6}{\pi}$

[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.

$\frac{1}{4}P = 3$

Point 1: (-14 , 5)

Point 2: (-11 , 3)

Point 3: (-8 ; 5)

Point 4: (-5 , 7)

Point 5: (-2 , 5)

Point 6: (1 , 3)

Point 7: (4 , 5)

Point 8: (7 , 7)

Point 9: (10 , 5)

[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 $y = -2\csc(\frac{\pi}{6}x + \frac{7\pi}{3}) + 5$.