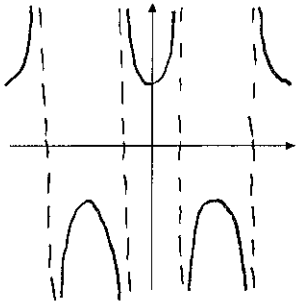These questions are about the non-sinusoidal trigonometric functions.   **SCORE: _____ / 8 PTS**
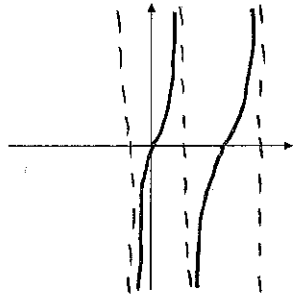
[a]   Sketch 2 periods of the graphs of the following functions.
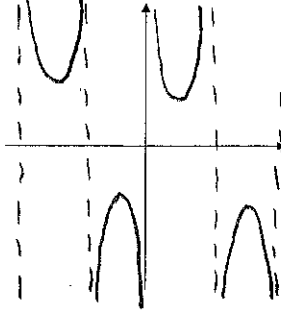   **NOTE: You only need to get the general position and shape correct. Do NOT plot points.**
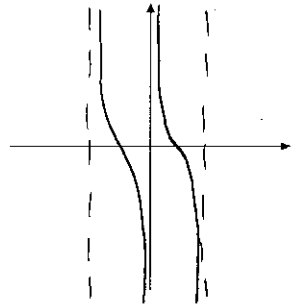
$y = \sec x$ $y = \tan x$ $y = \csc x$ $y = \cot x$

[b]   Fill in the blanks.

[1]   As $x \to \pi^-$, $\csc x \to$ _____ ∞ _____.

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

[3]   The equations of the vertical asymptotes of $y = \cot x$ are $\underline{x = n\pi}$, $n \in \mathbb{Z}$

[4]   The domain of $y = \sec x$ is $\underline{x \neq \frac{\pi}{2} + n\pi}$, $n \in \mathbb{Z}$

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

SCORE: _____ / 7 PTS

NOTE: The x – coordinates of the two points highlighted are $-\frac{3\pi}{5}$ and $\frac{\pi}{5}$.
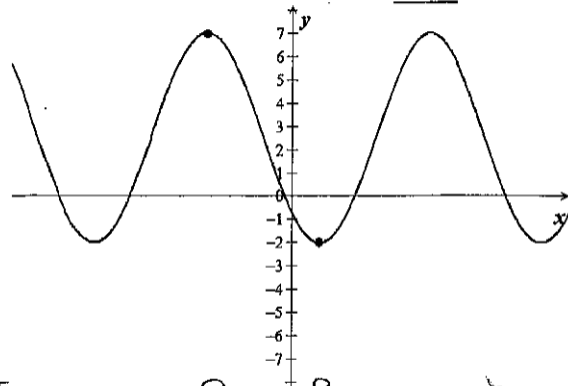
[a] Middle y – value = $\dfrac{5}{2}$ $\qquad \dfrac{7+(-2)}{2}$

[b] Amplitude = $\dfrac{9}{2}$ $\qquad \dfrac{7-(-2)}{2}$

[c] Phase shift = $-\dfrac{3\pi}{5}$

[d] Period = $\dfrac{8\pi}{5}$ $\qquad \frac{1}{2}P = \frac{\pi}{5} - -\frac{3\pi}{5} = \frac{4\pi}{5}$

$\dfrac{2\pi}{B} = \dfrac{8\pi}{5} \rightarrow B = 2\pi \cdot \dfrac{5}{8\pi} = \dfrac{5}{4}$

[e] An equation of the graph is $y = \dfrac{9}{2}\cos\dfrac{5}{4}\left(x + \dfrac{3\pi}{5}\right) + \dfrac{5}{2}$

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

SCORE: _____ / 15 PTS

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

Middle y – value = ___-5___

Maximum y – value = ___-1___ $-5+4$

Minimum y – value = ___-9___ $-5-4$

Amplitude = ___4___ $|-4|$

Period = ___$\frac{3}{2}$___ $\frac{2\pi}{\frac{4\pi}{3}} = 2\pi \cdot \frac{3}{4\pi}$

Phase shift = ___$-\frac{5}{4}$___ $\frac{4\pi}{3}x + \frac{5\pi}{3} = 0$

$\frac{4\pi}{3}x = -\frac{5\pi}{3}$

$x = -\frac{5\pi}{3} \cdot \frac{3}{4\pi}$

[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.

$\frac{1}{4}P = \frac{1}{4} \cdot \frac{3}{2} = \frac{3}{8}$

$-\frac{5}{4} = -\frac{10}{8}$

Point 1: ($\frac{-10}{8}$, -5)

Point 2: ($\frac{-7}{8}$, -9)

Point 3: ($\frac{-4}{8}$, -5)

Point 4: ($\frac{-1}{8}$, -1)

Point 5: ($\frac{2}{8}$, -5)

Point 6: ($\frac{5}{8}$, -9)

Point 7: ($\frac{8}{8}$, -5)

Point 8: ($\frac{11}{8}$, -1)

Point 9: ($\frac{14}{8}$, -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 $y = -4\csc(\frac{4\pi}{3}x + \frac{5\pi}{3}) - 5$. DOTTED GRAPH BELOW