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 $\frac{4\pi}{9}$.

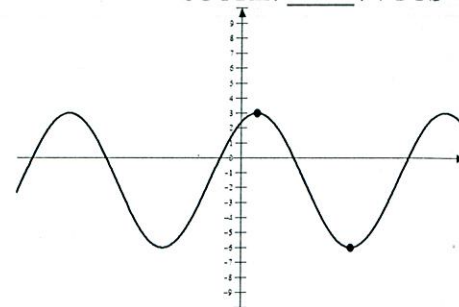[a]   Middle $y-$value = $\underline{\quad -\frac{3}{2} \quad}$ $\frac{3+-6}{2}$

[b]   Amplitude = $\underline{\quad \frac{9}{2} \quad}$ $\frac{3--6}{2}$

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

[d]   Period = $\underline{\quad \frac{2\pi}{3} \quad}$ $2\left(\frac{4\pi}{9}-\frac{\pi}{9}\right)=\frac{2\pi}{3}=\frac{2\pi}{B} \longrightarrow B=3$

[e]   An equation of the graph is $y = \underline{\quad \frac{9}{2}\cos 3\left(x-\frac{\pi}{9}\right)-\frac{3}{2} \quad}$.

These questions are about the non-sinusoidal trigonometric functions.

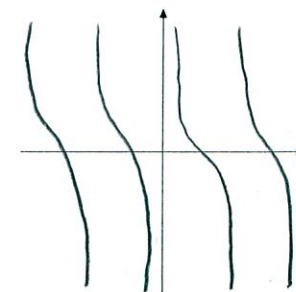[a]   Sketch 2 periods of the graphs of the following functions.
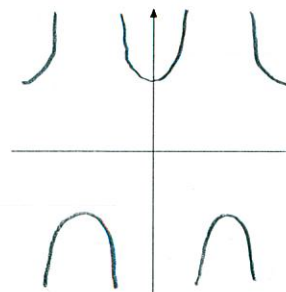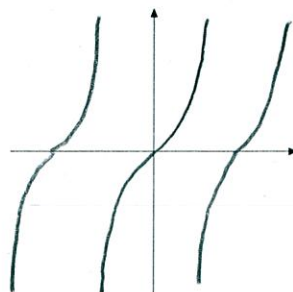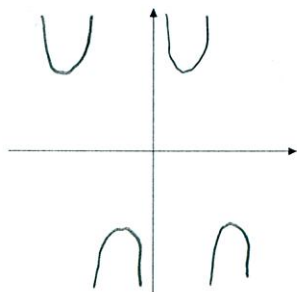**NOTE: You only need to get the general position and shape correct. Do NOT plot points.**

$y = \csc x$ $y = \tan x$ $y = \sec x$ $y = \cot x$

[b]   Fill in the blanks.

[1]   The equations of the vertical asymptotes of $y = \cot x$ are $\underline{\quad x = n\pi \quad}$.

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

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

[4]   As $x \to -\pi^{-}$, $\csc x \to \underline{\quad \infty \quad}$.

Let $y = -3\sin\left(\frac{5\pi}{3}x + \frac{7\pi}{3}\right) + 2$.   **SCORE:** _____ / 15 PTS

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

Middle y – value = ___2___   Amplitude = ___3___ $|-3|$

Maximum y – value = ___5___ $2+3$ Period = ___$\frac{6}{5}$___ $\frac{2\pi}{\frac{5\pi}{3}} = 2\pi \cdot \frac{3}{5\pi}$

Minimum y – value = ___-1___ $2-3$ Phase shift = ___$-\frac{7}{5}$___ $\frac{5\pi x}{3} + \frac{7\pi}{3} = 0$

$5x + 7 = 0$

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

[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.

$\frac{1}{4}$ PERIOD $= \frac{1}{4} \cdot \frac{6}{5}^{3} = \frac{3}{10}$

Point 1: (___$-\frac{7}{5}$___ , ___2___)

Point 2: (___$\frac{-11}{10}$___ , ___-1___) $-\frac{7}{5} + \frac{3}{10} = \frac{-14+3}{10} = \frac{-11}{10}$ Point 6: (___$\frac{1}{10}$___ , ___-1___)

Point 3: (___$\frac{-8}{10}$___ , ___2___) $\frac{-11}{10} + \frac{3}{10} = \frac{-8}{10}$ Point 7: (___$\frac{4}{10}$___ , ___2___)

Point 4: (___$\frac{-5}{10}$___ , ___5___)   Point 8: (___$\frac{7}{10}$___ , ___5___)

Point 5: (___$\frac{-2}{10}$___ , ___2___)   Point 9: (___$\frac{10}{10}$___ , ___2___)

[c]   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.
<u>You do NOT need to label each tick mark on each axis, only the ones you found in [b].</u>
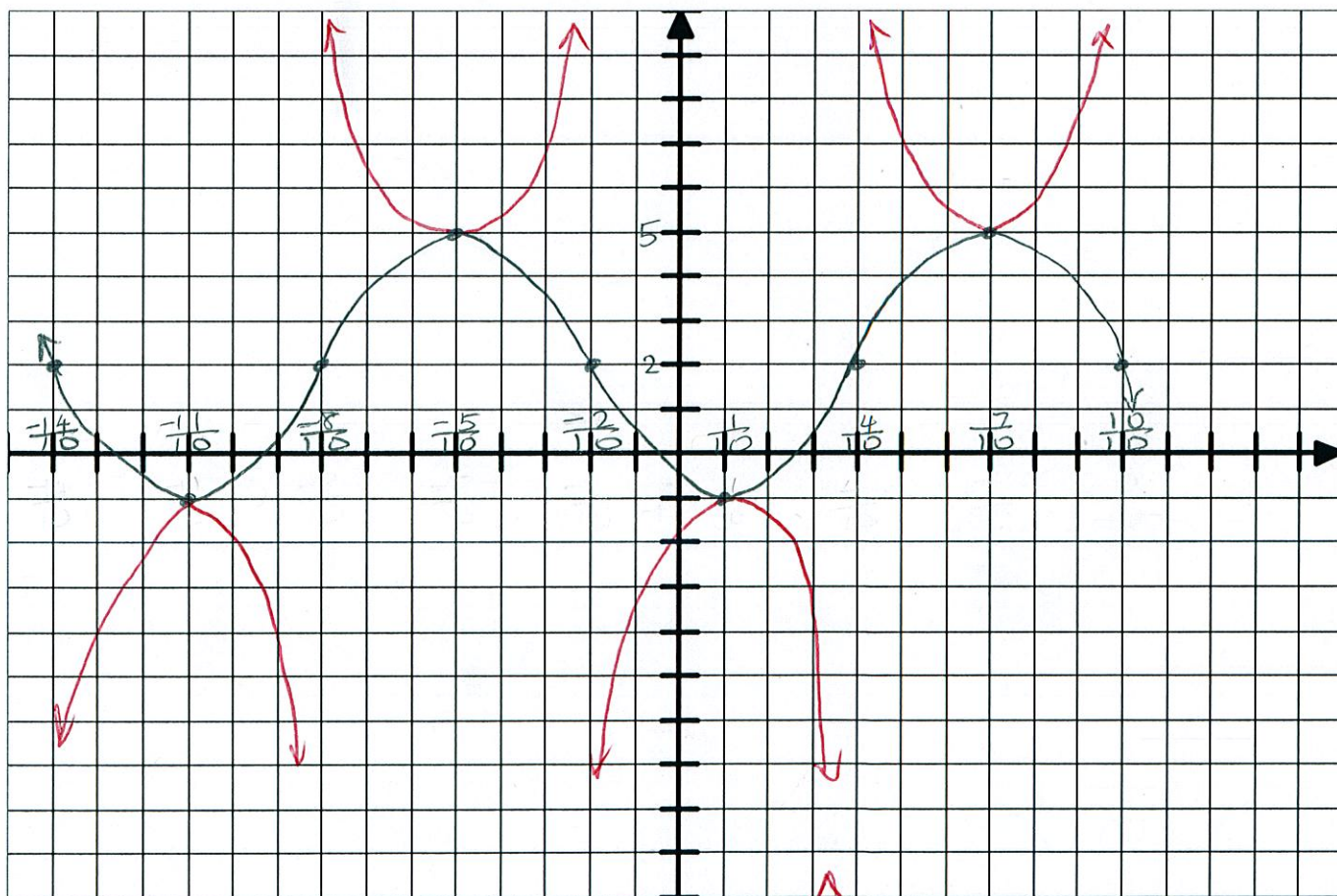
[d]   On the grid in [c], sketch the graph of $y = -3\csc\left(\frac{5\pi}{3}x + \frac{7\pi}{3}\right) + 2$.