Let $y = -3\sin(\frac{\pi}{10}x + \frac{7\pi}{5}) - 5$.

SCORE: ____ / 13 PTS

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

Middle $y-$value = -5

Amplitude = 3

Maximum $y-$value = -2 ($-5+3$)

Period = $\frac{2\pi}{\frac{\pi}{10}} = 2\pi \cdot \frac{10}{\pi} = 20$

Minimum $y-$value = -8 ($-5-3$)

Phase shift = -14

$\frac{\pi}{10}x + \frac{7\pi}{5} = 0 \rightarrow \frac{\pi}{10}x = -\frac{7\pi}{5} \rightarrow x = -\frac{7\pi}{5} \cdot \frac{10}{\pi}$

[b] Find the coordinates for all points corresponding to the middle, top and bottom of the graph of the function for 2 complete periods, **starting at the phase shift**.

$\frac{1}{4}$ PERIOD $= \frac{1}{4}(20) = 5$

Point 1: (-14 , -5)

Point 2: (-9 , -8)

Point 3: (-4 , -5)

Point 4: (1 , -2)

Point 5: (6 , -5)

Point 6: (11 , -8)

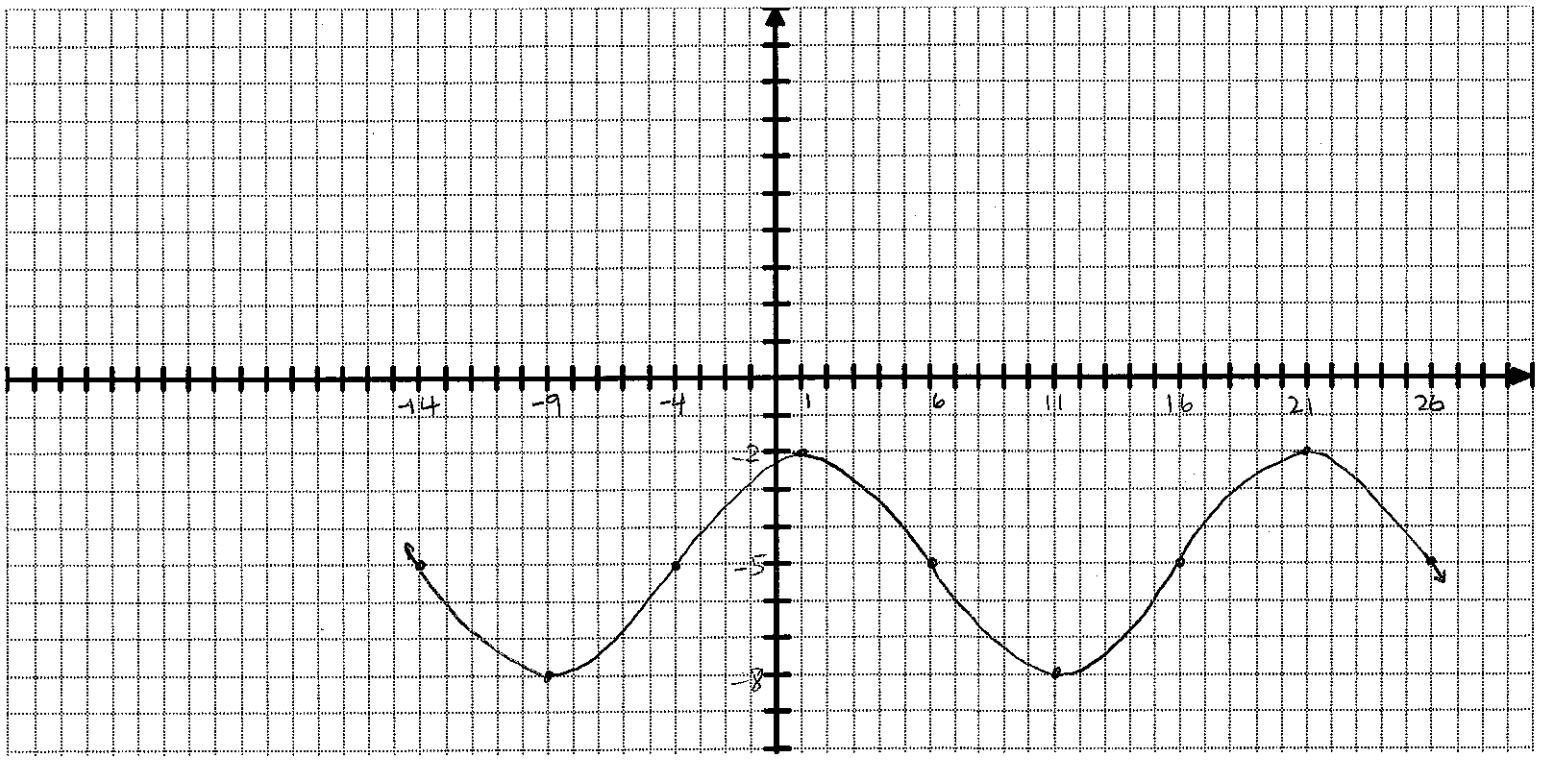
Point 7: (16 , -5)

Point 8: (21 , -2)

Point 9: (26 , -5)

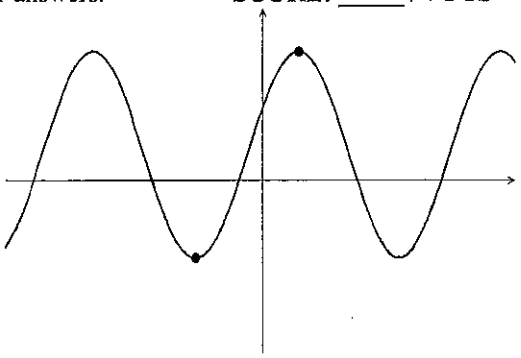
[c] On the graph paper below, sketch a detailed graph of 2 complete periods of the function using the information from [b]. You must label all $x-$ and $y-$values from [b] on the appropriate axes below, and you must use a consistent scale for each axis.

You do NOT need to label each tick mark on each axis, only the ones you found in [b].



Fill in the blanks regarding the graph on the right (**NOT DRAWN TO SCALE**). Simplify your answers. **SCORE: ____ / 7 PTS**

NOTE: The coordinates of the two points highlighted are $(-\frac{4\pi}{7}, -4)$ and $(\frac{2\pi}{7}, 9)$.



[a] Middle $y-$value = $\frac{9+(-4)}{2} = \frac{5}{2}$

[b] Amplitude = $\frac{9-(-5)}{2} = \frac{13}{2}$

[c] Phase shift = $-\frac{4\pi}{7}$ or $\frac{2\pi}{7}$

[d] Period = $\frac{12\pi}{7} = \frac{2\pi}{B} \rightarrow 12\pi B = 14\pi \rightarrow B = \frac{7}{6}$

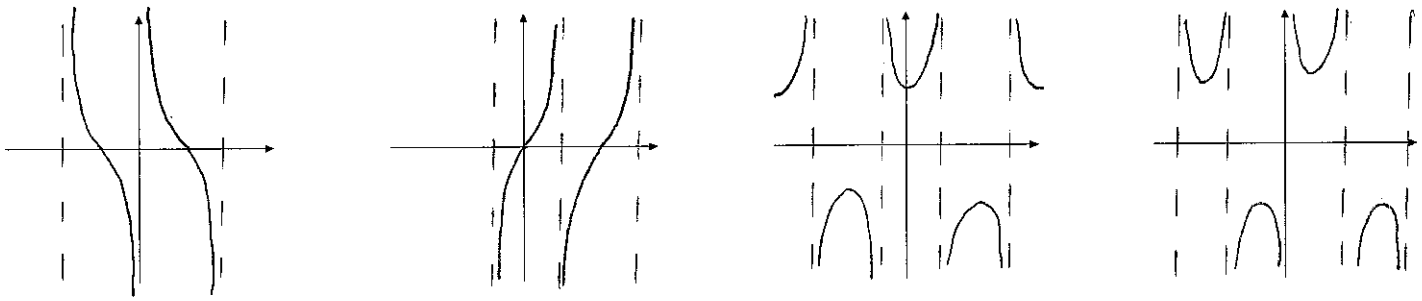
$\frac{1}{2}P = \frac{2\pi}{7} - (-\frac{4\pi}{7}) = \frac{6\pi}{7} \rightarrow P = \frac{6\pi}{7} \cdot 2$

[e] An equation of the graph is $y =$ IF PHASE SHIFT $= -\frac{4\pi}{7}$: $-\frac{13}{2}\cos\frac{7}{6}(x+\frac{4\pi}{7})+\frac{5}{2}$ or IF PHASE SHIFT $= \frac{2\pi}{7}$: $\frac{13}{2}\cos\frac{7}{6}(x-\frac{2\pi}{7})+\frac{5}{2}$

These questions are about the non-sinusoidal trigonometric functions. **SCORE: ____ / 10 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.

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



[b] Fill in the blanks.

[1] As $x \rightarrow -\pi^+$, $\csc x \rightarrow$ $-\infty$.

[2] As $x \rightarrow \frac{\pi}{2}^-$, $\sec x \rightarrow$ ∞.

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

[4] The range of $y = \csc x$ is $(-\infty, -1] \cup [1, \infty)$.

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

[6] The period of $y = \tan x$ is π.