Korpi: Notes

How to carefully and successfully sketch a full-fledged sinusoid

Let's walk through this example: $y = 5 - 7\cos\left(\frac{\pi}{6}x - \frac{\pi}{12}\right)$

Step 1: Identify the parent function and put into standard transformation form: $y = A\cos(B(x-C))+D$

$$y = -7\cos\left(\frac{\pi}{6}\left(x - \frac{1}{2}\right)\right) + 5$$

A transformation of cosine: CHALAH

Step 2: Identify $|A|, |B|, C, D$, and find the Period using $P = \frac{2\pi}{|B|}$

$|A| = 7$ (with x-axis reflection → HbLs switch)

$|B| = \frac{\pi}{6}$ (≈ 0.52 of a cycle in 2π)

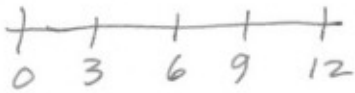
$P = \frac{2\pi}{|B|} = \frac{2\pi}{\pi/6} = \frac{2\pi}{1}\left(\frac{6}{\pi}\right) = \boxed{12}$

C = Right $\frac{1}{2}$ or 0.5, new y-axis @ $x = 0.5$

D = Up 5, new sinusoidal axis @ $y = 5$

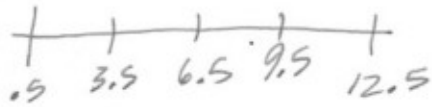
Step 3: Get your Horizontal Information

i) Get your 5 critical values for 1 cycle using the period

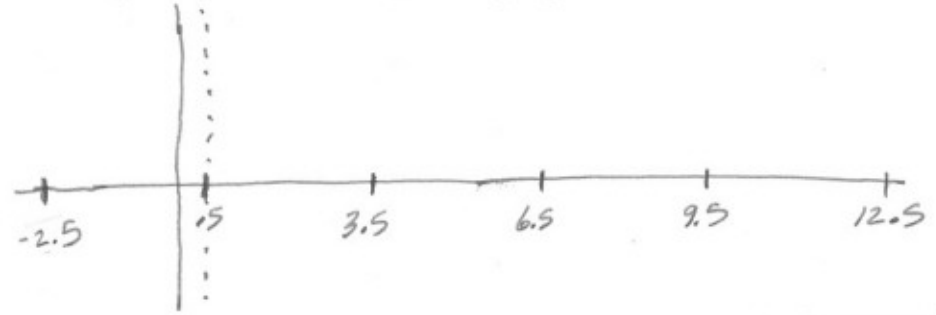


Notice 3 is the 1/4 cycle interval !!

ii) Adjust your values for any phase shift. In this case, we add $\frac{1}{2}$ to each of these (our C value)



iii) Transfer these (to scale) onto your graph.

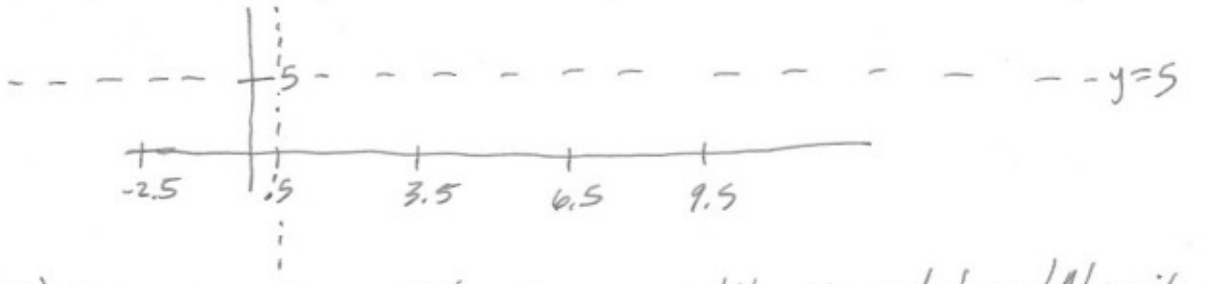


* Draw a dotted vertical line through your new y-axis
* You need to have at least 9 critical values to sketch 2 cycles. Keep the spacing, and label by adding/subtracting your 1/4 cycle interval (3 in this case)
* Always have at least one critical value on either side of the y-axis

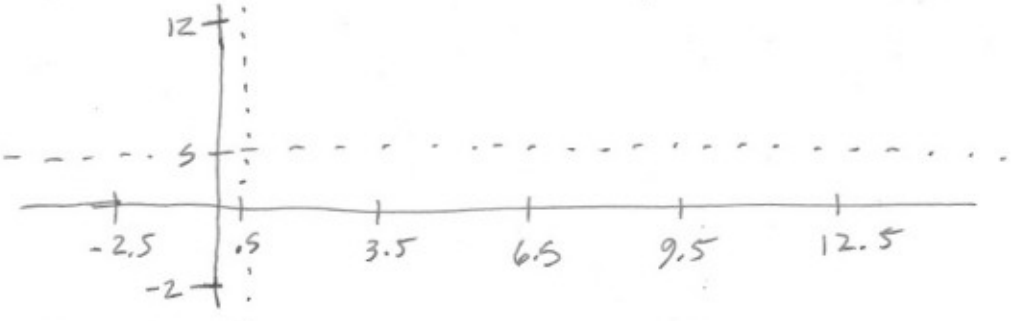
How to carefully sketch a sinusoid cont.

Step 4: Get your Vertical Information

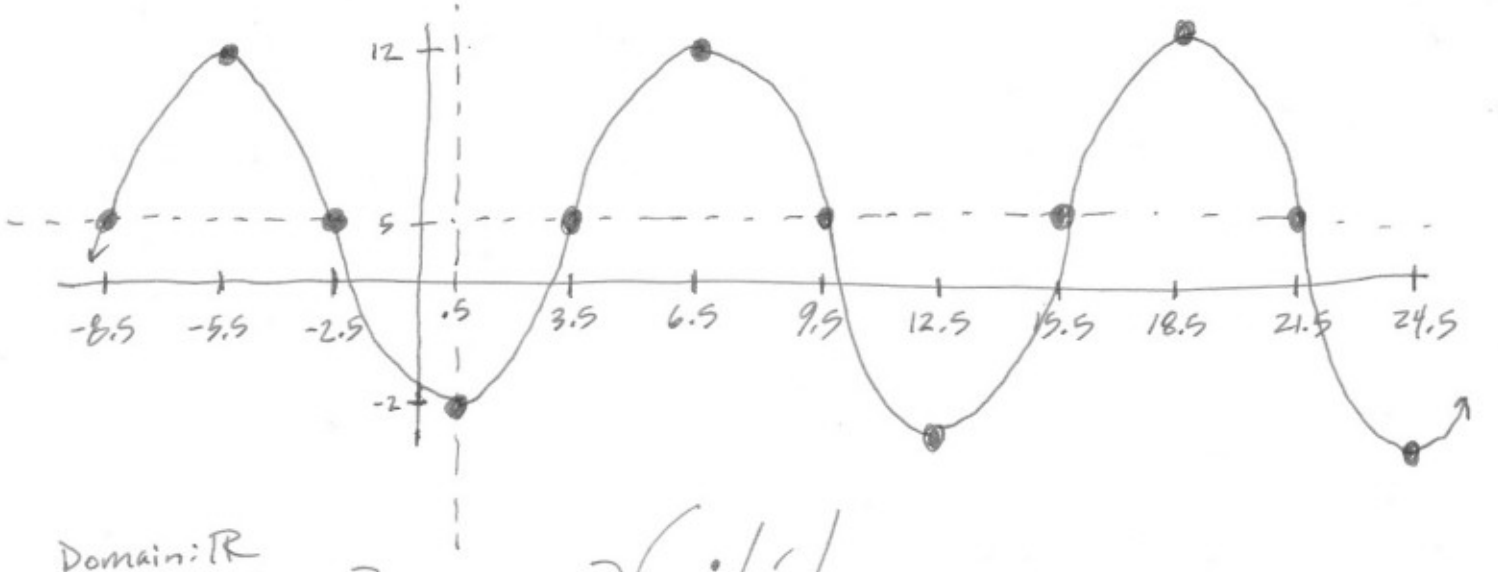
i) Sketch a dotted horizontal line through $y=D$, your new x-axis, and your new sinusoidal axis. Here $D=5$



ii) From your sinusoidal axis, go up $|A|$ units and down $|A|$ units on your y-axis and mark the High & Low points. Here $|A|=7$



Step 5: Mark your High, Low, and Axis pts. (H, L, A) using SAHALA, CHALAH remembering to interchange the H & Ls if A is negative. Begin at the intersection of your new x- and y-axes. Once the critical values are marked, connect them with nice curvy curves. Here we have CHALAH, or −CLAHAL



Domain: $\mathbb{R}$
Range: $[-2, 12]$

Voilá!

Practice, Practice, Practice, Practice, Practice!