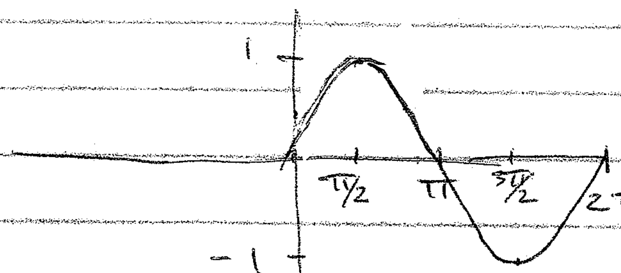
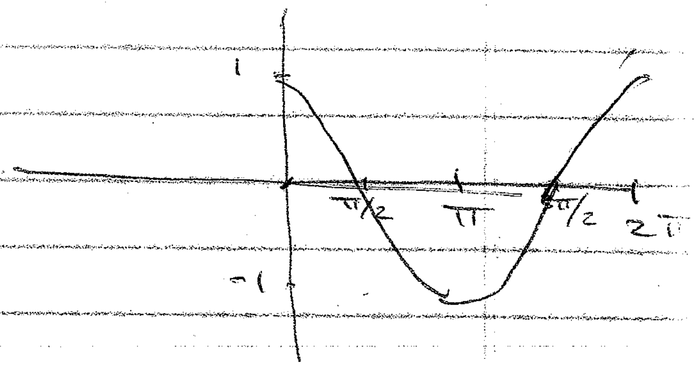
Notes on graphing $y = A\sin(Bx+C)+D$ and $y = A\cos(Bx+C)+D$

(1.) Start by sketching 1 period of the mother fcn. on $[0, 2\pi]$





You must memorize these, complete with intercepts + max / min.

(2.) Working only in this cycle, determine the endpts of the fcn. given. That is, find

$f(0)$ + $f(2\pi)$ for the transformation.

If there is no shift, these will be the same.

If there is a shift ($\frac{C}{B}$, where shift is left if $\frac{C}{B} > 0$ and right if $\frac{C}{B} < 0$), then the endpts will be at $x = \frac{-C}{B}$ + $\frac{2\pi - C}{B}$

(3.) Determine the new period: $P = \frac{2\pi}{B}$

This tells us if the cycle is longer $(B<1)$ or shorter $(B>1)$

4. Try sketching over the mother fcn. the shifted fcn. You won't have addressed the amplitude or vertical shift using this method.

5. On a different set of axes, sketch the final transformation, checking endpts, max, min, + intercepts.

You might have to move left of zero, but if you don't, then don't plot pts. below $x = 0$.

Example

Endpts $\left(-\frac{C}{B}, 0\right) + \left(\frac{2\pi - C}{B}, 0\right)$

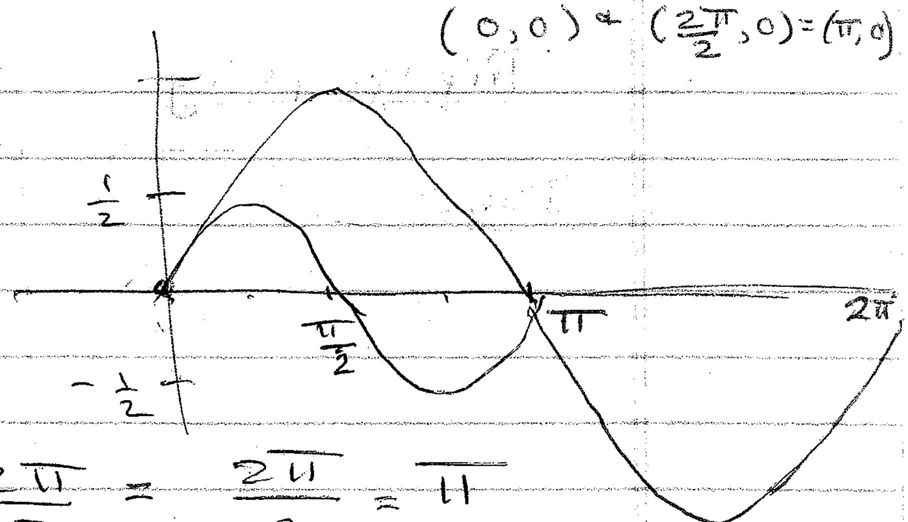
$(0,0) + \left(\frac{2\pi}{2}, 0\right) = (\pi, 0)$

$f(x) = \sin x$

$g(x) = \frac{1}{2}\sin(2x)$

$C = 0$ (no shift)

$A = \frac{1}{2}$



$B = 2$ so Period $= \frac{2\pi}{B} = \frac{2\pi}{2} = \pi$