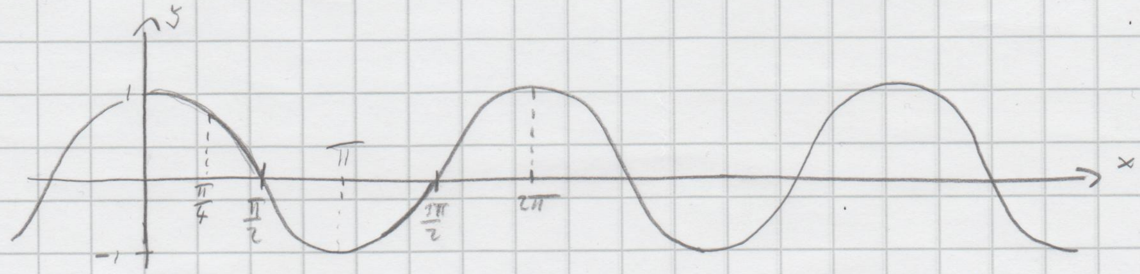
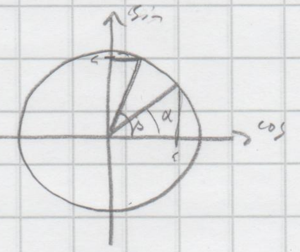
2 b



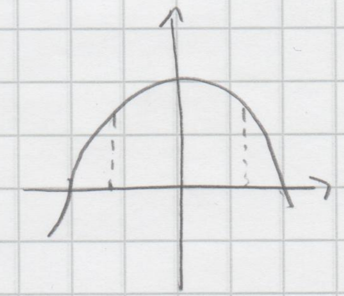


$\alpha = \frac{\pi}{2} - \beta$

$\sin\alpha = \cos\beta$

First we can "move" all x values to range $[0, 2\pi]$ by setting $x' = \left| x - \lfloor \frac{x}{2\pi} \rfloor \cdot 2\pi \right|$

Now it is fairly easy to "mirror" the function to be defined in four parts:



$$\cos(x') = \begin{cases} \cos(x') & , \; 0 < x' \le \frac{\pi}{2} \\ -\cos(-(x'-\pi)) & , \; \frac{\pi}{2} \le x' < \pi \\ -\cos(x'-\pi) & , \; \pi \le x < \frac{3\pi}{2} \\ \cos(-(x'-2\pi)) & , \; \frac{3\pi}{2} \le x \le 2\pi \end{cases}$$

$$= \begin{cases} \cos(x') \\ -\cos(\pi - x') \\ -\cos(x'-\pi) \\ \cos(2\pi - x') \end{cases}$$

Now we have reduced $\cos x$ to $[0, \frac{\pi}{2}]$. Now we have to reduce it further to $[0, \frac{\pi}{4}]$. Lets use the knowledge $\sin(\frac{\pi}{2} - x) = \cos x$ when $x \in [\frac{\pi}{4}, \frac{\pi}{2}]$ and $\sin x = \sqrt{1-\cos^2 x}$. Therefore

when $x' \in [0, \frac{\pi}{4}]$ $\cos(x') = \cos(x')$

when $x' \in [\frac{\pi}{4}, \frac{\pi}{2}]$ $\cos(x') = \sqrt{1-\cos^2(\frac{\pi}{2} - x')}$

Now combining this with earlier form:

$$\cos(x') \begin{cases} \cos(x') & , \; 0 \le x' < \frac{\pi}{4} \\ \sqrt{1-\cos^2(\frac{\pi}{2} - x')} & , \; \frac{\pi}{4} \le x' < \frac{\pi}{2} \\ -\sqrt{1-\cos^2(x - \frac{\pi}{2})} & , \; \frac{\pi}{2} \le x' < \frac{3\pi}{4} \\ -\cos(\pi - x') & , \; \frac{3\pi}{4} \le x' < \pi \\ -\cos(x'-\pi) & , \; \pi \le x' < \frac{5\pi}{4} \\ -\sqrt{1-\cos^2(\frac{3\pi}{2} - x')} & , \; \frac{5\pi}{4} \le x' < \frac{3\pi}{2} \\ \sqrt{1-\cos^2(x - \frac{3\pi}{2})} & , \; \frac{3\pi}{2} \le x' < \frac{7\pi}{4} \\ \cos(2\pi - x') & , \; \frac{7\pi}{4} \le x' < 2\pi \end{cases}$$

where $x' = \left| x - \lfloor \frac{x}{2\pi} \rfloor \cdot 2\pi \right|$