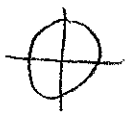
KEY

Graphing Trigonometric Functions

No calculators should be used on this worksheet.

1: What is the domain and what is the range for $\sin(x)$ and $\cos(x)$? Justify you answers based on the unit circle.

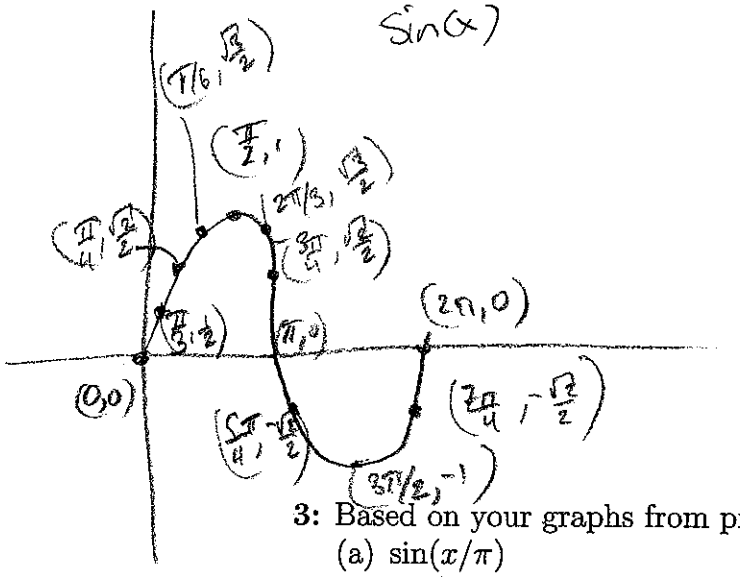


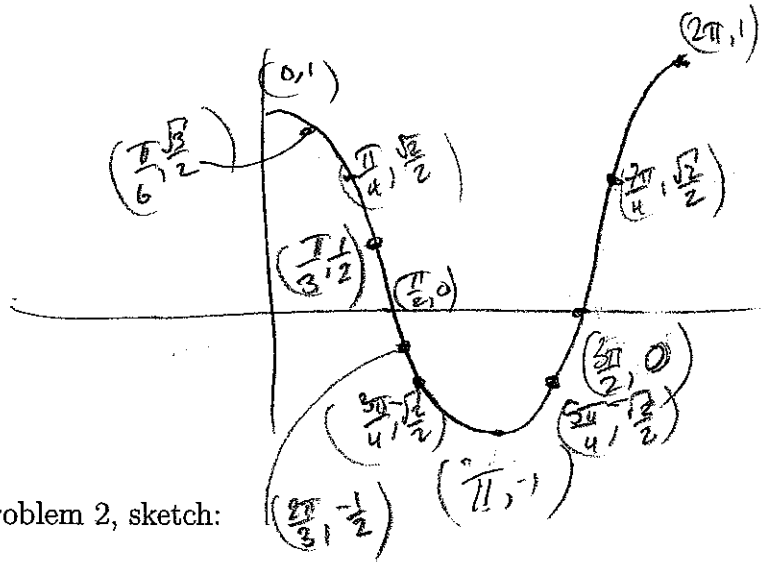
for a circle of radius 1, $-1 \le x \le 1$ and $-1 \le y \le 1$ So

$-1 \le \sin(x) \le 1$ and $-1 \le \cos(x) \le 1$

Additionally, keep going around the unit circle so the domain is $\mathbb{R}$

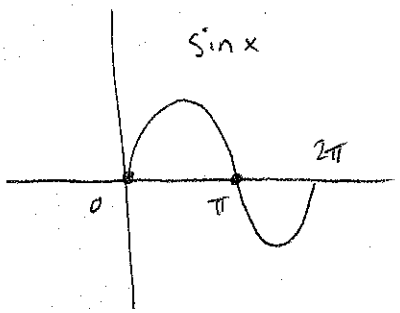
2: Graph $\sin(x)$ and $\cos(x)$: be sure to label at least a dozen points on each curve.





3: Based on your graphs from problem 2, sketch:

(a) $\sin(x/\pi)$

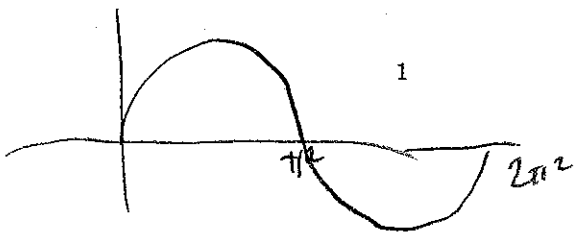


$\sin\left(\frac{x}{\pi}\right)$: forced to compute things that I know. E.g., when $x = \pi^2$, I'm taking $\sin(\pi)$ which I know is 0

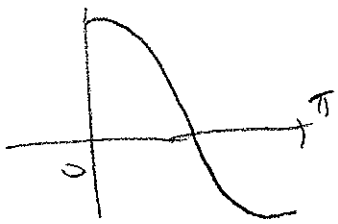
E.g., when I take $x = 0$, it's $\sin(0)$ which is also 0.

Between 0 and π $\sin(x)$ looks like $\cap$ so

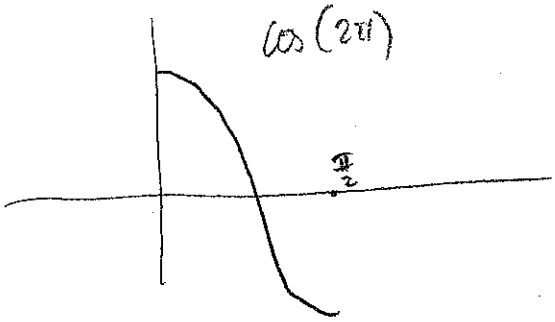
between 0 and π^2 $\sin\left(\frac{x}{\pi}\right)$ looks like $\cap$



cos x from 0 to π:



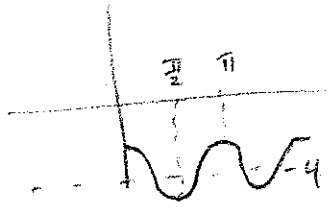
(b) $\cos(2x) - 4$



$x=0$, $\cos(2\cdot 0) = 1$

$x=\frac{\pi}{2}$ $\cos\left(2\cdot\frac{\pi}{2}\right) = -1$

shift down 4

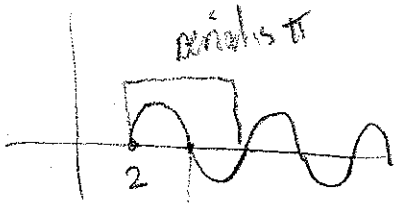


(c) $\cos(2x - 4)$

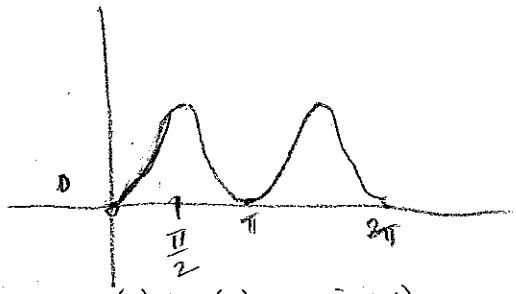
I want to evaluate cos at 0 so I set $2x-4=0 \Rightarrow x=2$

I want to evaluate cos at π so I set $2x-4=\pi \Rightarrow x=\frac{4+\pi}{2} \approx \frac{4+3.14}{2}$

≈ 3.57



(d) $\sin^2(x)$

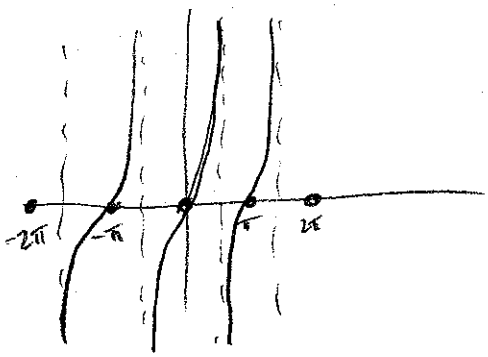


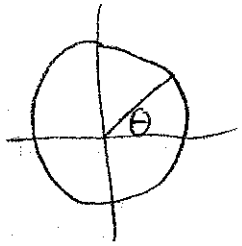
(e) $\tan(x) = \frac{\sin(x)}{\cos(x)}$

axes and asymptotes:

$\sin(x) = 0$ when $x = 0, \pi, 2\pi, -\pi, -2\pi$, etc.

$\cos(x) = 0$ when $x = \frac{\pi}{2}, -\frac{\pi}{2}, \frac{3\pi}{2}, -\frac{3\pi}{2}$, etc.





as $\theta \to \frac{\pi}{2}$ from 0,

sin → 1 and cos → 0 so tan θ → +∞

as $\theta \to -\frac{\pi}{2}$ from 0,

tan θ → −∞