

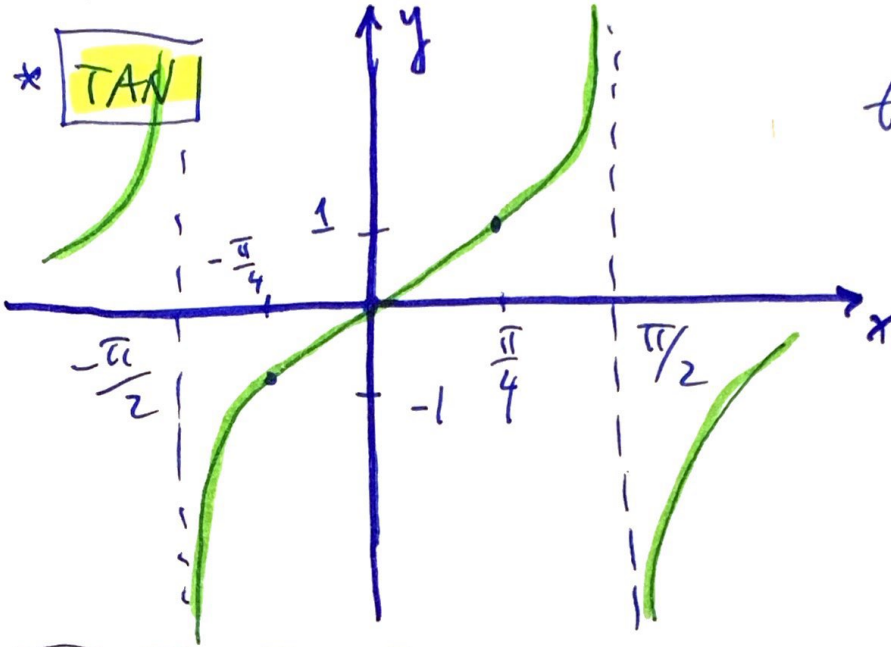
G.2

Graphing Tan, Cot, Sec, Csc

(1)

↳ part 1

* TAN



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

• zeros $x = n\pi$ ←
when $\cos(x) = 0$

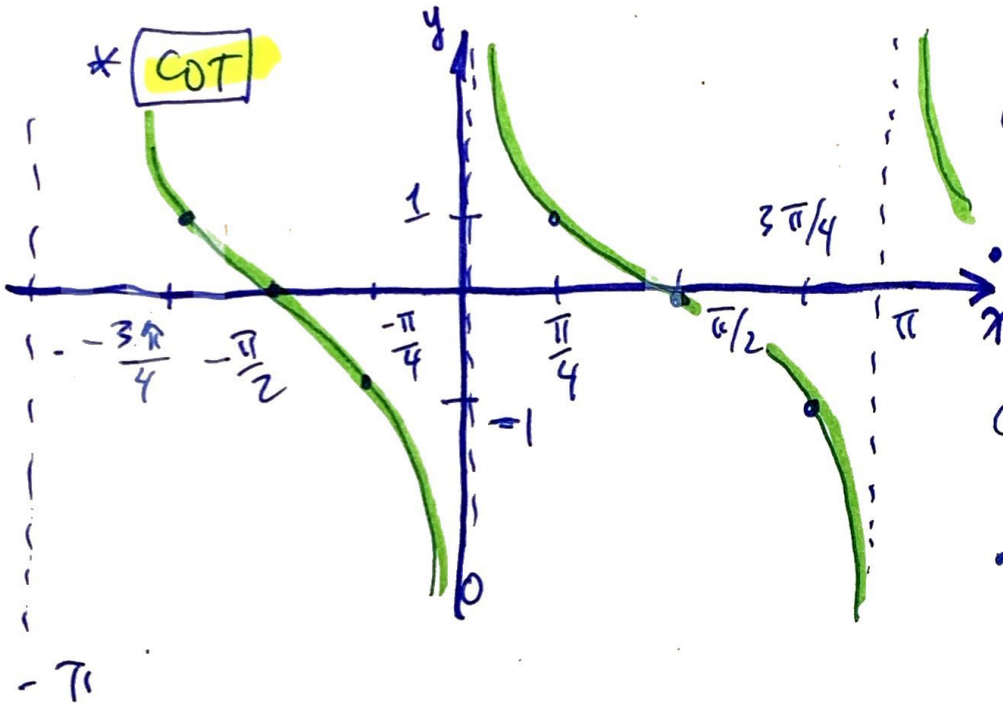
we have an

• asymptotes

$$\left(\frac{2n+1}{2}\right)\pi$$

← zeros of cos

* COT



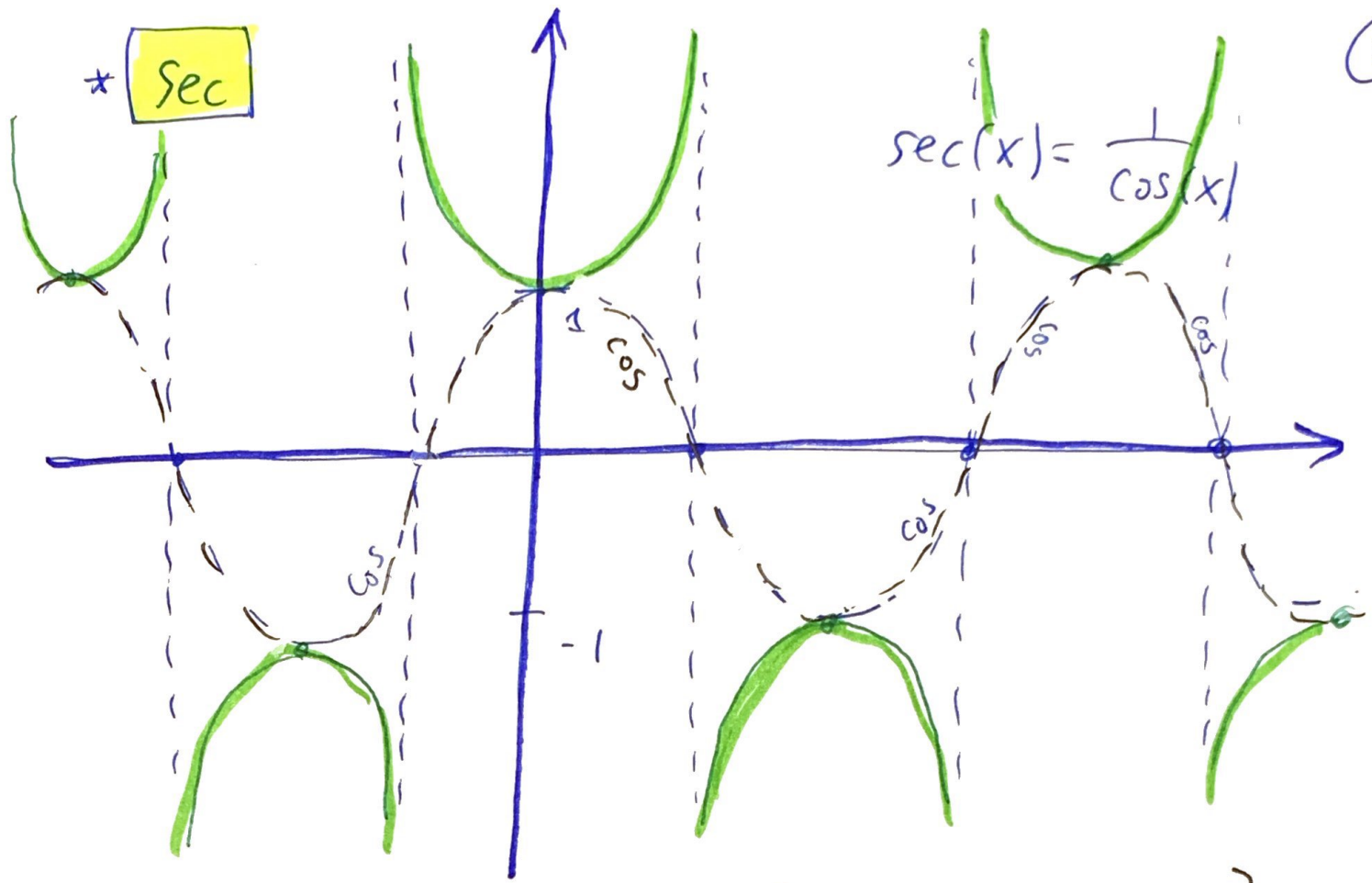
$$\cot(x) = \frac{1}{\tan(x)}$$

• asymptotes @ $x = n\pi$

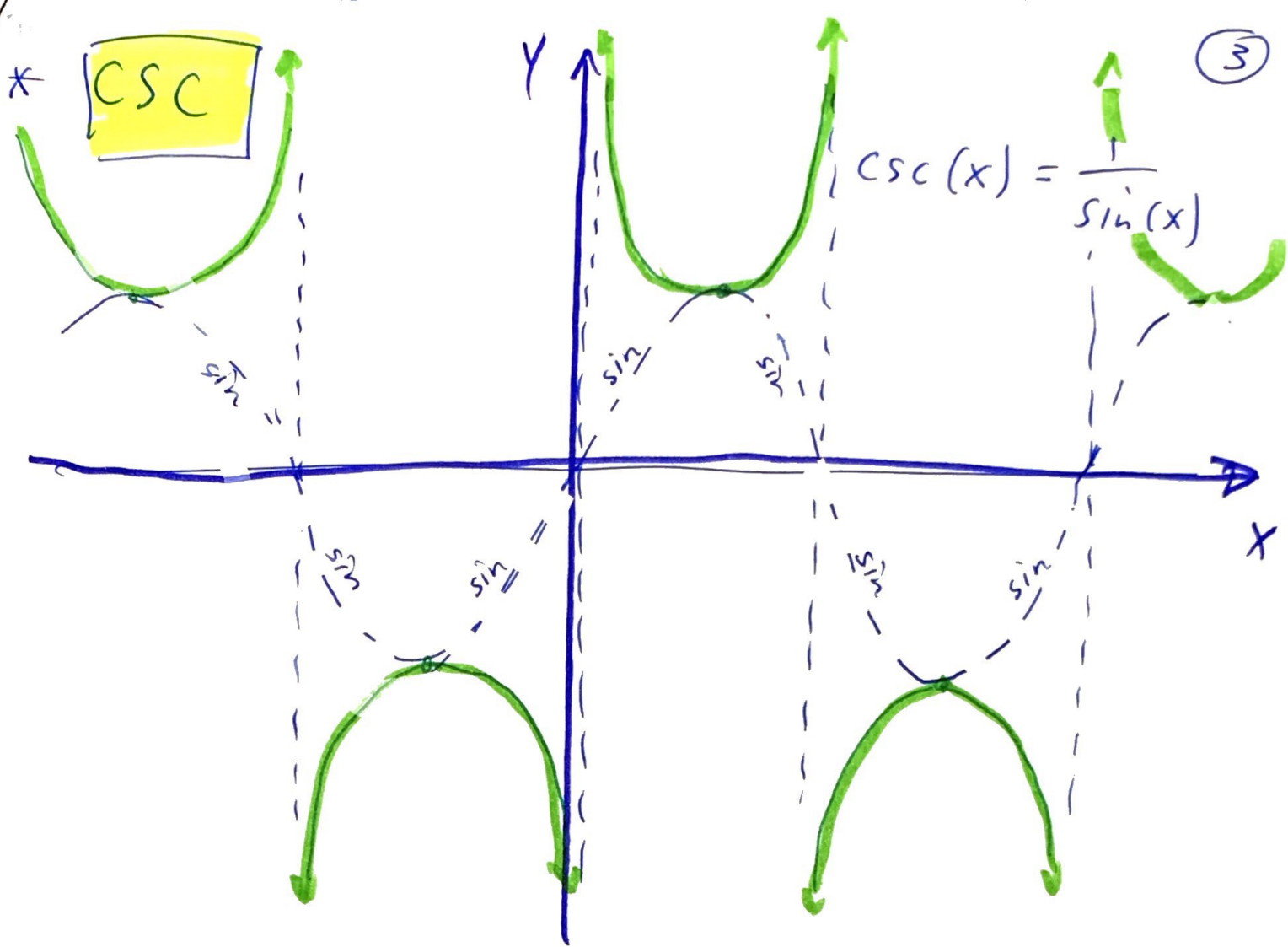
$$\cot(x) = \frac{\cos(x)}{\sin(x)}$$

• zeros at odd multiples of $\pi/2$ ← zeros of sin

$$x = \frac{2n+1}{2}\pi$$



- Domain: $D_{\sec} : \left\{ x \mid x \neq \frac{2n+1}{2} \pi \right\}$
- Range: $R_{\sec} : \left\{ y \mid y \geq 1 \text{ or } y \leq -1 \right\}$
 - ↳ odd multiples of $\pi/2$
- Asymptotes @ $x = \left(\frac{2n+1}{2} \right) \pi$
 - ↳ zeros of cos
- No zeros unless a vertical shift



• Domain $D_{\csc} = \{x \mid x \neq n\pi\}$

• Range $R_{\csc} = \{y \mid y \leq -1 \text{ or } y \geq 1\}$

• asymptotes: $x = n\pi$

• No zeros unless a vertical shift.