

Trigonometry Chapter 4

Section 3 & 4

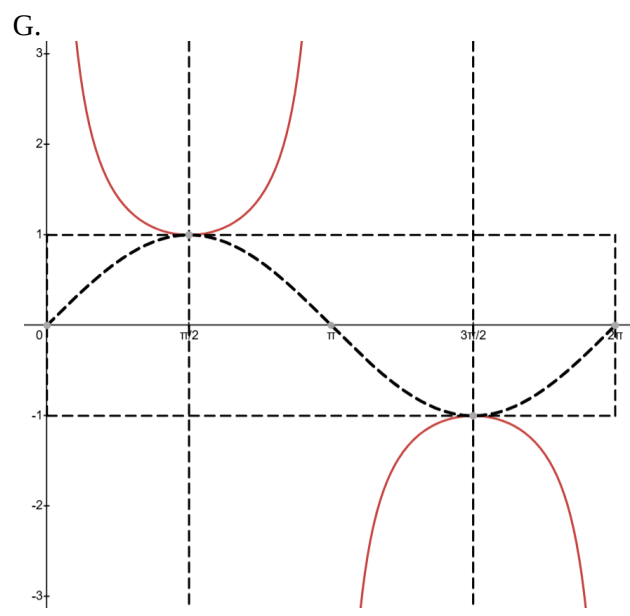
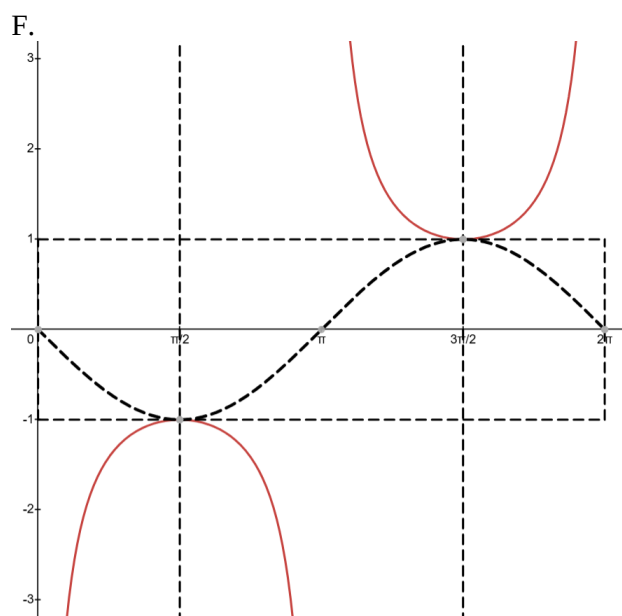
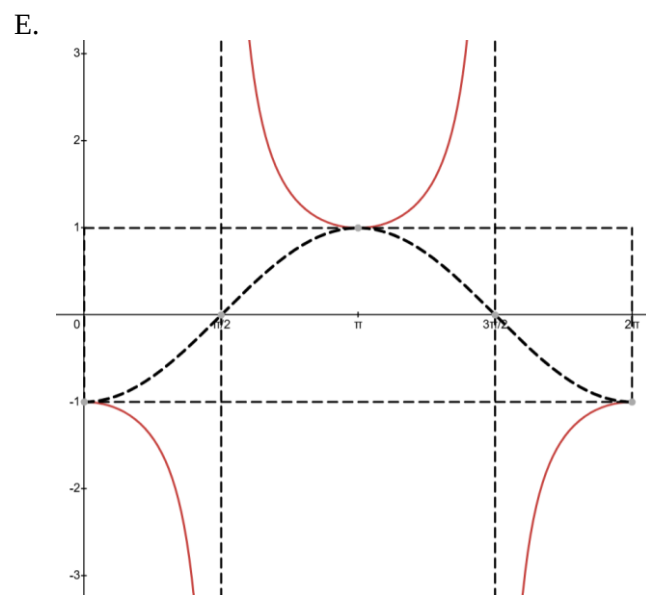
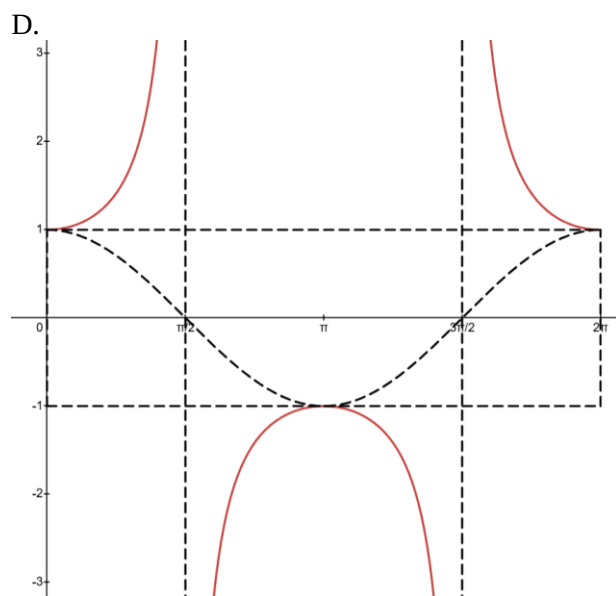
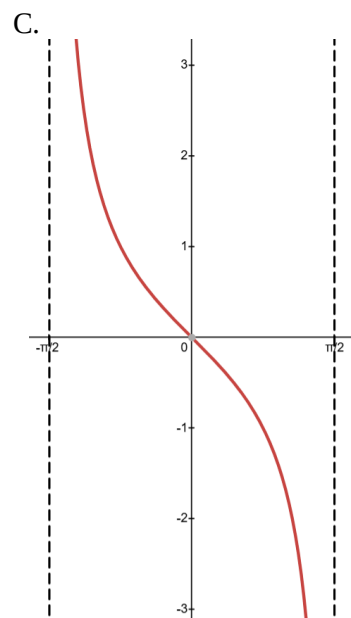
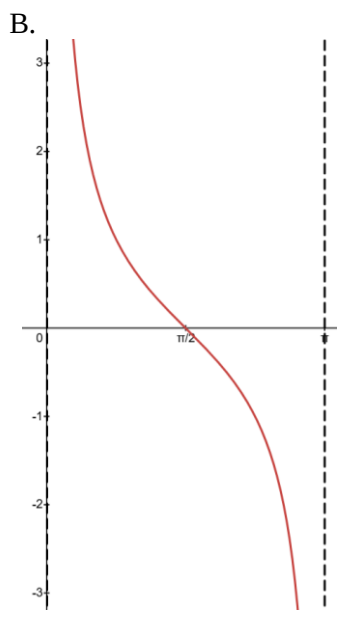
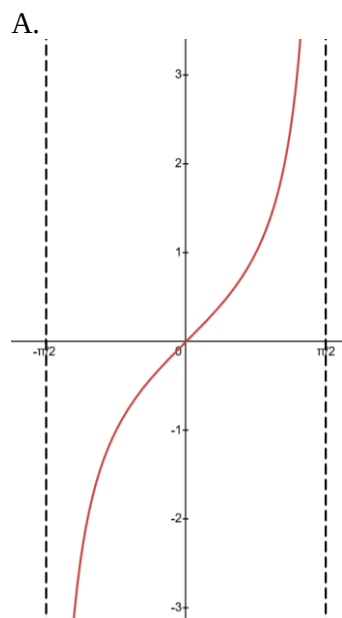
I. Vocabulary

Complete each statement:

1. To find the vertical asymptotes of the function $f(x) = \tan(x)$ solve the equation _____.
2. To find the vertical asymptotes of the function $f(x) = \cot(x)$ solve the equation _____.
3. To find the vertical asymptotes of the function $f(x) = \sec(x)$ solve the equation _____.
4. To find the vertical asymptotes of the function $f(x) = \csc(x)$ solve the equation _____.
5. The function $f(x) = \sec(x)$ has the same vertical asymptotes as does the function _____.
6. The function $f(x) = \cot(x)$ has the same vertical asymptotes as does the function _____.
7. State the domain and range for each function:
 - a) $f(x) = \sin(x)$ $D_f : \underline{\hspace{2cm}}$ $R_f : \underline{\hspace{2cm}}$
 - b) $f(x) = \csc(x)$ $D_f : \underline{\hspace{2cm}}$ $R_f : \underline{\hspace{2cm}}$
 - c) $f(x) = \cos(x)$ $D_f : \underline{\hspace{2cm}}$ $R_f : \underline{\hspace{2cm}}$
 - d) $f(x) = \sec(x)$ $D_f : \underline{\hspace{2cm}}$ $R_f : \underline{\hspace{2cm}}$
 - e) $f(x) = \tan(x)$ $D_f : \underline{\hspace{2cm}}$ $R_f : \underline{\hspace{2cm}}$
 - f) $f(x) = \cot(x)$ $D_f : \underline{\hspace{2cm}}$ $R_f : \underline{\hspace{2cm}}$

II. Match each function with its one-period graph. Note that not all graphs will be use

- | | |
|----------------------------|-----------------------------|
| 8. _____ $f(x) = -\tan(x)$ | 9. _____ $f(x) = \sec(x)$ |
| 10. _____ $f(x) = \csc(x)$ | 11. _____ $f(x) = \cot(x)$ |
| 12. _____ $f(x) = \tan(x)$ | 13. _____ $f(x) = -\sec(x)$ |



III. Graph each function over one period.

Example:

a) $f(x) = \tan\left(x - \frac{\pi}{4}\right)$ b) $f(x) = 2 \csc(x + \pi) - 2$

Solution:

a) $f(x) = \tan\left(x - \frac{\pi}{4}\right)$

Basic shape:



Shift: $\rightarrow \frac{\pi}{4}$

Standard
Interval:

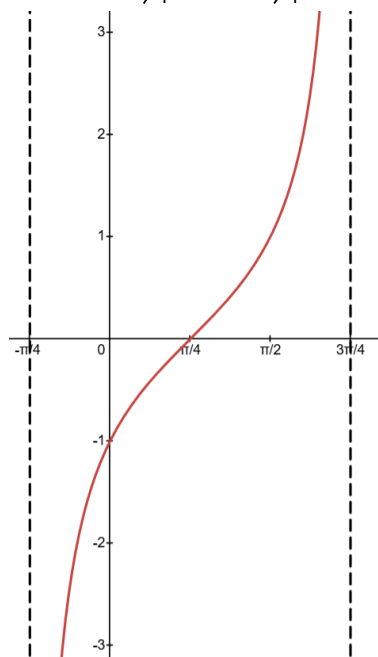
$$-\frac{\pi}{2} \leq x - \frac{\pi}{4} < \frac{\pi}{2}$$

$$\Rightarrow -\frac{\pi}{2} + \frac{\pi}{4} \leq x - \frac{\pi}{4} + \frac{\pi}{4} < \frac{\pi}{2} + \frac{\pi}{4}$$

$$\Rightarrow -\frac{\pi}{2} + \frac{\pi}{4} \leq x - \frac{\pi}{4} + \frac{\pi}{4} < \frac{2\pi}{4} + \frac{\pi}{4}$$

$$\Rightarrow -\frac{\pi}{4} \leq x < \frac{3\pi}{4}$$

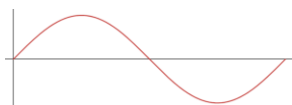
So we have:



b) $f(x) = 2 \csc(x + \pi) - 2$

First, sketch graph of $f(x) = 2 \sin(x + \pi) - 2$

Basic shape:



Shift: $\leftarrow \pi, \downarrow 2$

Amplitude: $|2| = 2$

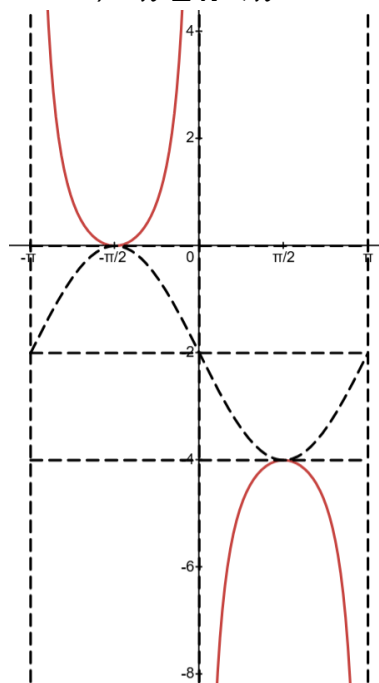
Standard Interval:

$$0 \leq x + \pi < 2\pi$$

$$\Rightarrow 0 - \pi \leq x + \pi - \pi < 2\pi - \pi$$

$$\Rightarrow -\pi \leq x < \pi$$

So we have:



14. $f(x) = \cot\left(x - \frac{3\pi}{2}\right)$

15. $f(x) = \csc\left(x - \frac{3\pi}{2}\right)$

16. $f(x) = \sec\left(x + \frac{\pi}{2}\right) - 1$

17. $f(x) = -\csc(2x) - 1$

18. $f(x) = \tan(2x + \pi)$

19. $f(x) = 2 \csc(x) - 1$

20. $f(x) = -\tan\left(\frac{1}{4}x\right)$

21. $f(x) = -3 \sec(x) + 2$

22. $f(x) = \frac{1}{3} \sec\left(x - \frac{\pi}{2}\right)$