

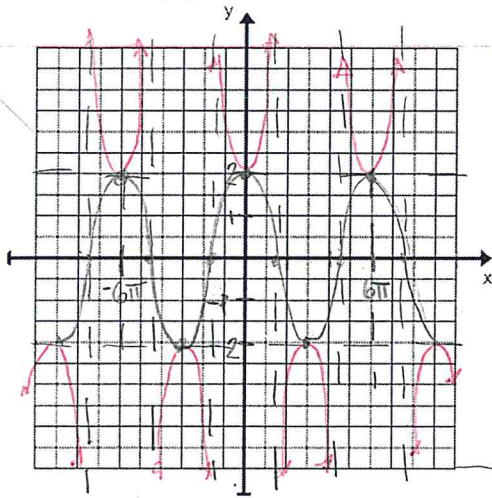
Pre-Calculus

Chapter 4 (Part 2) Test Review

Graph each function using radians.

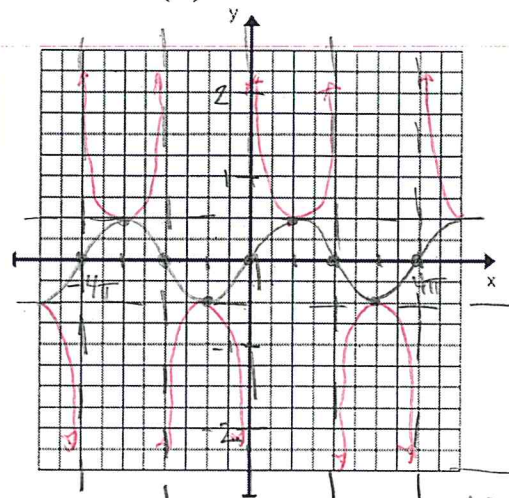
1.  $y = 2\sec\left(\frac{x}{3}\right)$   $y = 2\cos\left(\frac{x}{3}\right)$

$p \cdot b = 2\pi$   
 $p \cdot \frac{1}{3} = 2\pi$   
 $p = 6\pi$



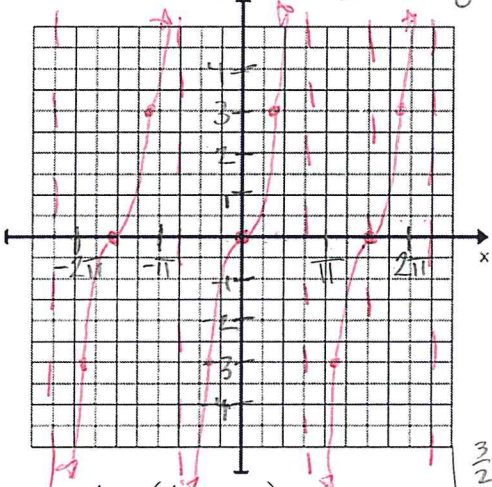
2.  $y = \frac{1}{2}\csc\left(\frac{x}{2}\right)$   $y = \frac{1}{2}\sin\left(\frac{x}{2}\right)$

$p \cdot b = 2\pi$   
 $p \cdot \frac{1}{2} = 2\pi$   
 $p = 4\pi$



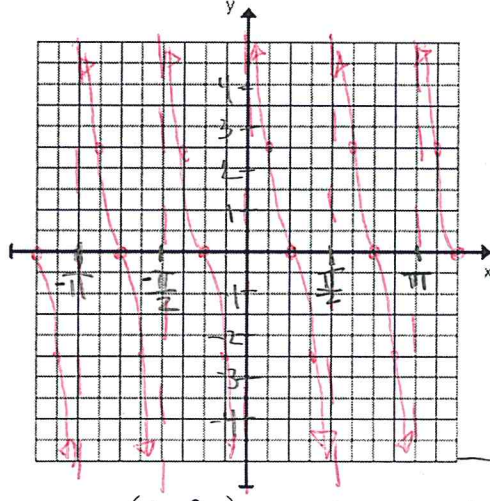
3.  $y = 3\tan\left(\frac{2x}{3}\right)$   $\frac{\sin \frac{2x}{3} \leftarrow \text{roots}}{\cos \frac{2x}{3} \leftarrow \text{vert. asy.}}$

asy  $\cos \frac{2x}{3} = 0$   
 $\frac{3 \cdot 2x}{2} = \left(\frac{\pi}{2}, \frac{3\pi}{2}\right) \cdot \frac{3}{2}$   
 $x = \frac{3\pi}{4}, \frac{9\pi}{4}$   
 $p \cdot b = \pi$   
 $p \cdot \frac{2}{3} = \pi$   
 $p = \frac{3\pi}{2}$



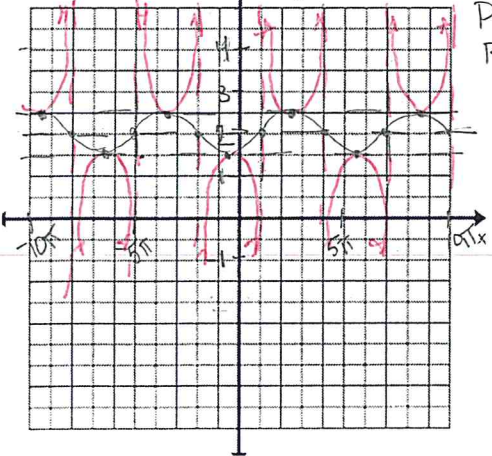
4.  $y = \frac{5}{2}\cot(2x)$   $\frac{5}{2} \cdot \frac{\cos 2x \leftarrow \text{roots}}{\sin 2x \leftarrow \text{vert. asy.}}$

asy  $\sin 2x = 0$   
 $2x = 0, \pi, 2\pi$   
 $x = 0, \frac{\pi}{2}, \pi$   
 $p \cdot b = \pi$   
 $p \cdot 2 = \pi$   
 $p = \frac{\pi}{2}$



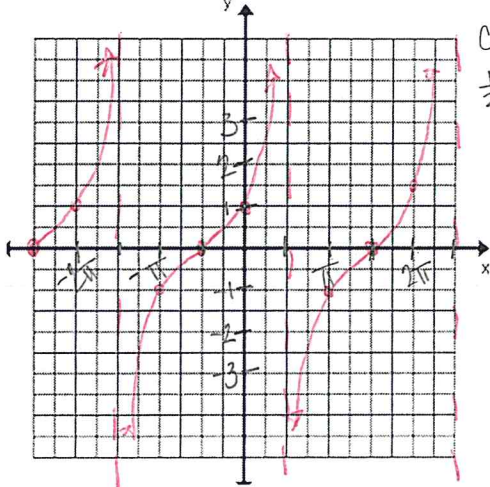
5.  $y = \frac{1}{2}\csc\left(\frac{1}{3}(x-\pi)\right) + 2$   $y = \frac{1}{2}\sin\left(\frac{1}{3}(x-\pi)\right) + 2$

$p \cdot b = 2\pi$   
 $p \cdot \frac{1}{3} = 2\pi$   
 $p = 6\pi$



6.  $y = \tan\left(\frac{x}{2} + \frac{3\pi}{4}\right) = \tan\left(\frac{1}{2}(x - \frac{3\pi}{2})\right)$   $\frac{\sin \leftarrow \text{roots}}{\cos \leftarrow \text{asy}}$

$\cos\left(\frac{1}{2}(x - \frac{3\pi}{2})\right) = 0$   
 $\frac{1}{2}(x - \frac{3\pi}{2}) = \frac{\pi}{2}, -\frac{\pi}{2}, \frac{3\pi}{2}$   
 $x - \frac{3\pi}{2} = \pi, -\pi, 3\pi$   
 $x = \frac{5\pi}{2}, \frac{\pi}{2}, \frac{9\pi}{2}$



$p \cdot b = \pi$   
 $p \cdot \frac{1}{2} = \pi$   
 $p = 2\pi$

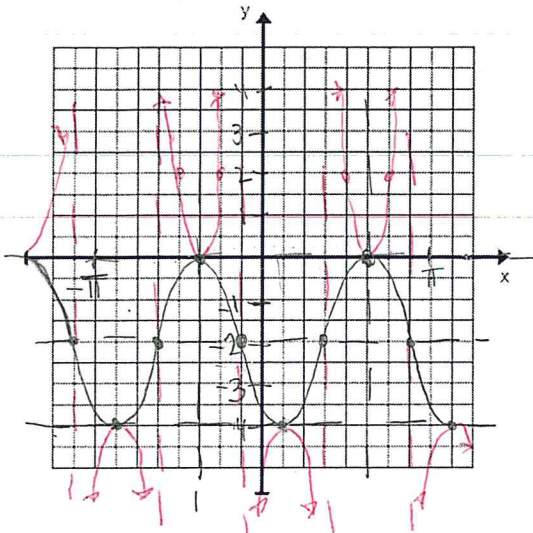
$$y = 2\cos\left(2\left(x + \frac{2\pi}{8}\right)\right) - 2$$

$$7. y = 2\sec\left(2x + \frac{3\pi}{4}\right) - 2$$

$$p \cdot b = 2\pi$$

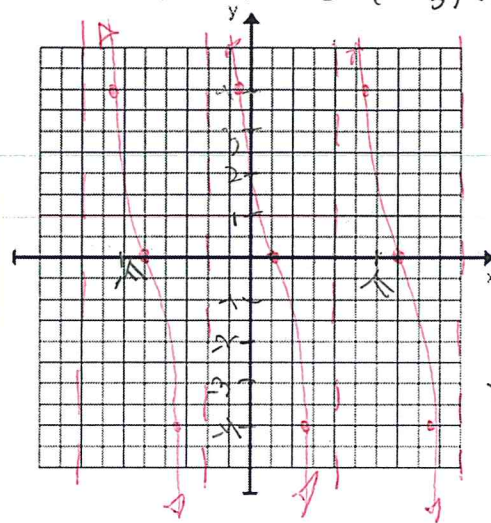
$$p \cdot 2 = 2\pi$$

$$p = \pi$$



$$8. y = 4\cot\left(x - \frac{2\pi}{3}\right) = 4 \frac{\cos\left(x - \frac{2\pi}{3}\right)}{\sin\left(x - \frac{2\pi}{3}\right)}$$

4 roots  $p \cdot b = \pi$   
 $p \cdot 1 = \pi$   
 $p = \pi$



asy

$$\sin\left(x - \frac{2\pi}{3}\right) = 0$$

$$x - \frac{2\pi}{3} = 0, \pi, 2\pi, \dots$$

$$x = \frac{2\pi}{3}, \frac{5\pi}{3}, \frac{8\pi}{3}, \dots$$

roots

$$\cos\left(x - \frac{2\pi}{3}\right) = 0$$

$$x - \frac{2\pi}{3} = \frac{\pi}{2}, \frac{3\pi}{2}, \dots$$

$$x = \frac{7\pi}{6}, \frac{7\pi}{6}$$

Solve each equation for  $0 \leq \theta \leq 2\pi$ .

$$9. \frac{17}{4} = 4 + \frac{1}{4} \csc\left(\frac{\theta}{2}\right)$$

$$\frac{17}{4} - \frac{16}{4} = \frac{1}{4} \csc\left(\frac{\theta}{2}\right)$$

$$\frac{1}{4} = \frac{1}{4} \csc\left(\frac{\theta}{2}\right)$$

$$1 = \csc\left(\frac{\theta}{2}\right)$$

$$\sin\left(\frac{\theta}{2}\right) = 1$$

$$\frac{\theta}{2} = \frac{\pi}{2}, \frac{5\pi}{2}, \frac{3\pi}{2}, \frac{7\pi}{2}$$

$$\theta = \pi, 5\pi, 3\pi, 7\pi$$

$$13. -5 - 2\sec 4\theta = -3$$

$$-2\sec 4\theta = 2$$

$$\sec 4\theta = -1$$

$$\cos 4\theta = -1$$

$$4\theta = \pi, 3\pi, 5\pi, 7\pi$$

$$\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

$$10. 1 + 2\cot\left(\theta + \frac{2\pi}{3}\right) = -1$$

$$2\cot\left(\theta + \frac{2\pi}{3}\right) = -2$$

$$\cot\left(\theta + \frac{2\pi}{3}\right) = -1$$

$$\theta + \frac{2\pi}{3} = \frac{3\pi}{4}, \frac{7\pi}{4}, \frac{11\pi}{4}$$

$$\theta + \frac{8\pi}{12} = \frac{9\pi}{12}, \frac{21\pi}{12}, \frac{33\pi}{12}$$

$$\theta = \frac{\pi}{12}, \frac{13\pi}{12}, \frac{25\pi}{12}$$

$$11. 2 + 2\sec(-2\theta) = 0$$

$$2\sec(-2\theta) = -2$$

$$\sec(-2\theta) = -1$$

$$\cos(-2\theta) = -1$$

$$-2\theta = \pi, 3\pi, 5\pi, 7\pi$$

$$\theta = \frac{3\pi}{2}, \frac{\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}$$

$$12. 1 - 2\tan\left(\theta + \frac{11\pi}{6}\right) = 1$$

$$-2\tan\left(\theta + \frac{11\pi}{6}\right) = 0$$

$$\tan\left(\theta + \frac{11\pi}{6}\right) = 0$$

note:  $\tan x = 0 \Rightarrow \sin x = 0$

$$\sin\left(\theta + \frac{11\pi}{6}\right) = 0$$

$$\theta + \frac{11\pi}{6} = 0, \pi, 2\pi, 3\pi, 4\pi$$

$$\theta = -\frac{11\pi}{6}, \frac{5\pi}{6}, \frac{\pi}{6}, \frac{7\pi}{6}, \frac{13\pi}{6}$$

$$\theta = \frac{\pi}{6}, \frac{7\pi}{6}$$

$$14. 4 = 4 - 3\tan 2\theta$$

$$0 = -3\tan 2\theta$$

$$\tan 2\theta = 0$$

note:  $\tan x = 0 \Rightarrow \sin x = 0$

$$\sin 2\theta = 0$$

$$2\theta = 0, \pi, 2\pi, 3\pi, 4\pi$$

$$\theta = 0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$$

$$15. -8 = -4 - 2\csc\left(\theta + \frac{\pi}{3}\right)$$

$$-4 = -2\csc\left(\theta + \frac{\pi}{3}\right)$$

$$2 = \csc\left(\theta + \frac{\pi}{3}\right)$$

$$\sin\left(\theta + \frac{\pi}{3}\right) = \frac{1}{2}$$

$$\theta + \frac{\pi}{3} = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}$$

$$\theta = -\frac{\pi}{6}, \frac{\pi}{2}, \frac{11\pi}{6}$$

$$\theta = \frac{\pi}{2}, \frac{11\pi}{6}$$

$$16. -4 - 2\tan(-\theta) = -2$$

$$-2\tan(-\theta) = 2$$

$$\tan(-\theta) = -1$$

$$-\theta = \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}, \frac{9\pi}{4}$$

$$\theta = \frac{5\pi}{4}, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{7\pi}{4}$$