Trig Graphing Review
Graphing Csc, Sec, Tan, Cot

Name Key

For each of the following functions, identify the domain and range of the "primary" phase and the period.

	Domain	Range	Period
1. sine	$[0, 2\pi]$	$[-1, 1]$	2π
2. cosine	$[0, 2\pi]$	$[-1, 1]$	2π
3. cosecant	$(0, \pi) \cup (\pi, 2\pi)$	$(-\infty, -1] \cup [-1, \infty)$	2π
3 asymp. 4. secant	$[0, \frac{\pi}{2}) \cup (\frac{\pi}{2}, \frac{3\pi}{2}) \cup (\frac{3\pi}{2}, 2\pi]$	$(-\infty, -1] \cup [1, \infty)$	2π
2 asym. 5. tangent	$(-\frac{\pi}{2}, \frac{\pi}{2})$ $(-90°, 90°)$	$(-\infty, \infty)$	π
6. cotangent	$(0, \pi)$ $(0°, 180°)$	$(-\infty, \infty)$	π

Fill in the blank.

7. To graph a secant or cosecant, you would first graph it's reciprocal function. (Hint: It's a word that starts with the letter "r".)

8. The reciprocal of secant is cosine.

9. The reciprocal of cosecant is sine.

10. Secant, cosecant, tangent, and cotangent all have undefined values that are represented by a(an) asymptote on the graph.

Graph and identify the period, domain, range, and asymptotes.

11. $y = 3\csc\left(2x - \frac{\pi}{6}\right)$

12. $y = \frac{1}{2}\sec\left(\frac{x}{3} + \frac{\pi}{4}\right)$

13. $y = 3\tan(2\theta - 40°)$

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

15. $y = 2\cot(3\theta - 90°) - 2$

16. $y = -\csc\left(\frac{x}{3}\right)$

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

18. $y = -3\tan(4x - \pi)$

Answers

1. D: $[0,2\pi]$ R: $[-1,1]$ pd = 2π

2. D: $[0,2\pi]$ R: $[-1,1]$ pd = 2π

3. D: $(0,\pi)\cup(\pi,2\pi)$ R: $(-\infty,-1]\cup[1,\infty)$ pd = 2π

4. D: $\left[0,\frac{\pi}{2}\right)\cup\left(\frac{\pi}{2},\frac{3\pi}{2}\right)\cup\left(\frac{3\pi}{2},2\pi\right]$ R: $(-\infty,-1]\cup[1,\infty)$ pd = 2π

5. D: $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ R: $(-\infty,\infty)$ pd = π

6. D: $(0,\pi)$ R: $(-\infty,\infty)$ pd = π

7. reciprocal

8. cosine

9. sine

10. asymptote

11. pd= 2π D: $\left(\frac{\pi}{12},\frac{7\pi}{12}\right)\cup\left(\frac{7\pi}{12},\frac{13\pi}{12}\right)$ R: $(-\infty,-3]\cup[3,\infty)$ asy @ $\frac{\pi}{12},\frac{7\pi}{12},\frac{13\pi}{12}$

12. pd = 6π D: $\left[-\frac{3\pi}{4},\frac{3\pi}{4}\right)\cup\left(\frac{3\pi}{4},\frac{15\pi}{4}\right)\cup\left(\frac{15\pi}{4},\frac{21\pi}{4}\right]$ R: $\left(-\infty,-\frac{1}{2}\right]\cup\left[\frac{1}{2},\infty\right)$ asy @ $\frac{3\pi}{4},\frac{15\pi}{4}$

13. pd = $90°$ D: $(-25°,65°)$ R: $(-\infty,\infty)$ asy @ $-25°,65°$

14. pd = 2π D: $(2\pi,4\pi)$ R: $(-\infty,\infty)$ asy @ $2\pi,4\pi$

Trig Graphing Review

11. $y = 3\csc\left(2x - \frac{\pi}{6}\right)$

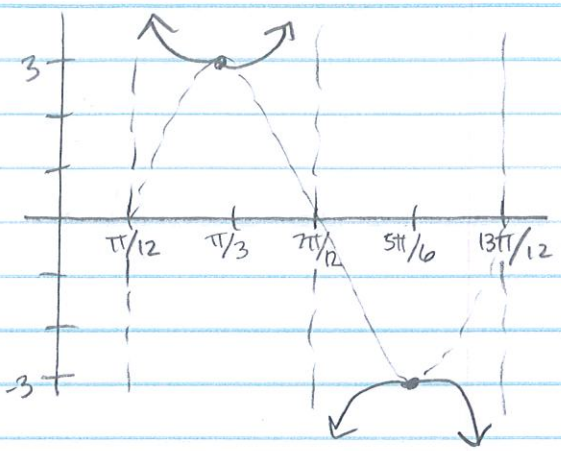
graph sin then csc

$2x - \frac{\pi}{6} = 0 \qquad 2x - \frac{\pi}{6} = 2\pi$

$\left(\frac{1}{2}\right)2x = \frac{\pi}{6}\left(\frac{1}{2}\right) \qquad 2x = \frac{12\pi}{6} + \frac{\pi}{6}$

$\boxed{x = \frac{\pi}{12}} \qquad \left(\frac{1}{2}\right)2x = \frac{13\pi}{6}\left(\frac{1}{2}\right)$

$\boxed{x = \frac{13\pi}{12}}$



D: $\left(\frac{\pi}{12}, \frac{7\pi}{12}\right) \cup \left(7\pi/12, 13\pi/12\right)$

R: $(-\infty, -3] \cup [3, \infty)$

Period: $\frac{13\pi}{12} - \frac{\pi}{12} = \frac{12\pi}{12} = \pi$

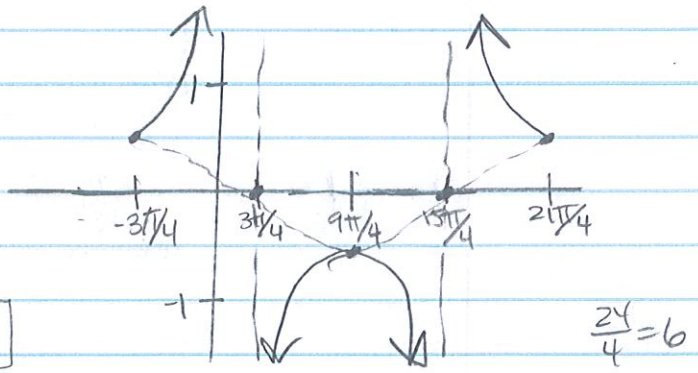
12. $y = \frac{1}{2}\sec\left(\frac{x}{3} + \frac{\pi}{4}\right)$

graph cos then sec

$\frac{x}{3} + \frac{\pi}{4} = 0 \qquad \frac{x}{3} + \frac{\pi}{4} = 2\pi$

$(3)\frac{x}{3} = -\frac{\pi}{4}(3) \qquad \frac{x}{3} = \frac{8\pi}{4} - \frac{\pi}{4}$

$\boxed{x = -\frac{3\pi}{4}} \qquad (3)\frac{x}{3} = \frac{7\pi}{4}(3) = \boxed{\frac{21\pi}{4}}$



$\frac{24}{4} = 6$

D: $\left[-\frac{3\pi}{4}, \frac{3\pi}{4}\right) \cup \left(\frac{3\pi}{4}, \frac{15\pi}{4}\right) \cup \left(\frac{15\pi}{4}, \frac{21\pi}{4}\right]$

R: $(-\infty, -\frac{1}{2}] \cup [\frac{1}{2}, \infty)$

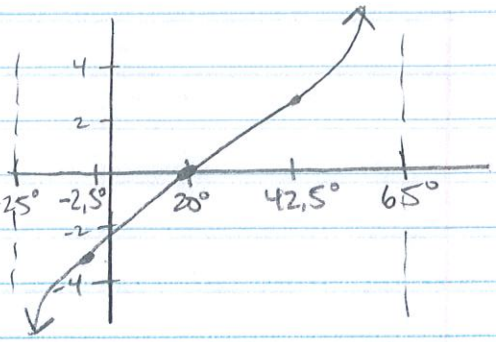
Period: $\frac{21\pi}{4} - -\frac{3\pi}{4} = \frac{24\pi}{4} = 6\pi$

13. $y = 3\tan(2\theta - 40°)$

$2\theta - 40° = -90°$ $\quad 2\theta - 40° = 90°$

$2\theta = -50°$ $\quad 2\theta = 130°$

$\boxed{\theta = -25°}$ $\quad \boxed{\theta = 65°}$



$\frac{90}{4} = 22,5$

D: $(-25°, 65°)$

R: $(-\infty, \infty)$

Period: $65 - -25 = 90°$

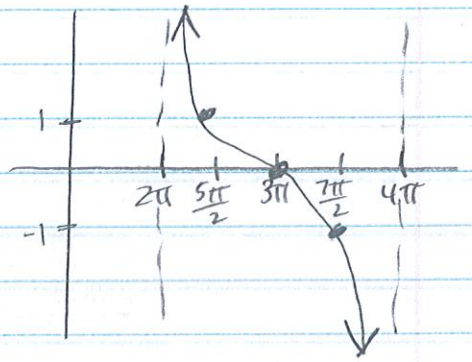
14. $y = \cot\left(\frac{x}{2} - \pi\right)$

$\frac{x}{2} - \pi = 0$ $\quad \frac{x}{2} - \pi = \pi$

$(2)\frac{x}{2} = \pi(2)$ $\quad \frac{x}{2} = \pi + \pi$

$\boxed{x = 2\pi}$ $\quad (2)\frac{x}{2} = 2\pi(2)$

$\boxed{x = 4\pi}$



D: $(2\pi, 4\pi)$

R: $(-\infty, \infty)$

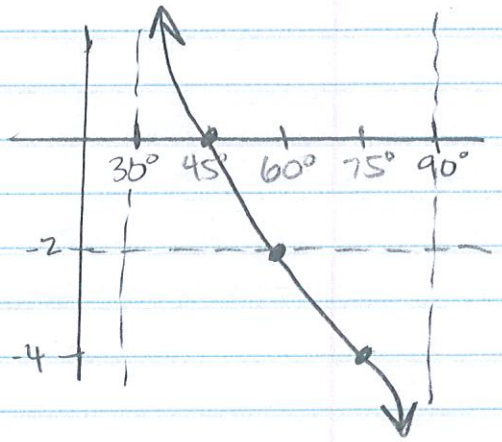
Period $= 4\pi - 2\pi = 2\pi$

15. $y = 2\cot(3\theta - 90°) - 2$

$3\theta - 90° = 0$ $\quad 3\theta - 90 = 180°$

$3\theta = 90°$ $\quad 3\theta = 270°$

$\boxed{\theta = 30°}$ $\quad \boxed{\theta = 90°}$



D: $(30°, 90°)$

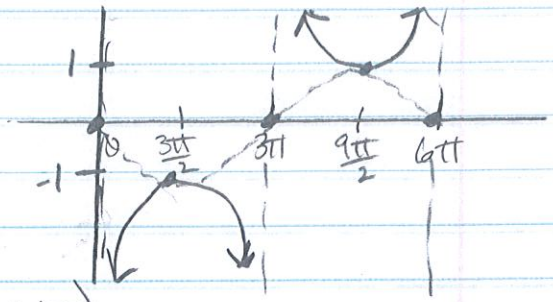
R: $(-\infty, \infty)$

Period: $90° - 30° = 60°$

16. $y = -\csc\left(\frac{x}{3}\right)$

$\frac{x}{3} = 0$ $\quad$ $\frac{x}{3} = 2\pi$

$\boxed{x = 0}$ $\quad$ $\boxed{x = 6\pi}$



*graph sin
*Reflect

D: $(0, 3\pi) \cup (3\pi, 6\pi)$

R: $(-\infty, -1] \cup [1, \infty)$

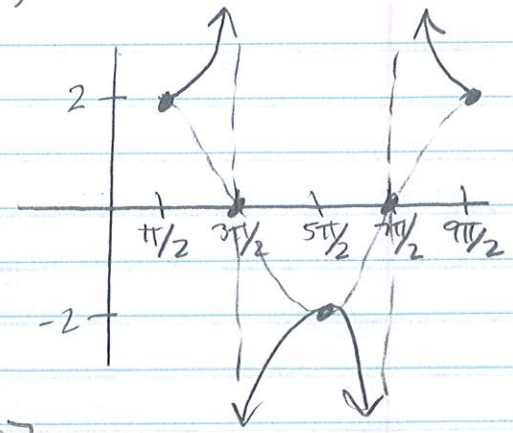
Period $= 6\pi$

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

$\frac{x}{2} - \frac{\pi}{4} = 0$ $\quad$ $\frac{x}{2} - \frac{\pi}{4} = 2\pi$

(2) $\frac{x}{2} = \frac{\pi}{4}$ (2) $\quad$ (2) $\frac{x}{2} = \frac{8\pi}{4} + \frac{\pi}{4} = \frac{9\pi}{4}$ (2)

$\boxed{x = \frac{\pi}{2}}$ $\quad$ $\boxed{x = \frac{9\pi}{2}}$



*graph cos

D: $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right) \cup \left(\frac{3\pi}{2}, \frac{7\pi}{2}\right) \cup \left(\frac{7\pi}{2}, \frac{9\pi}{2}\right]$

R: $(-\infty, -2] \cup [2, \infty)$

Period $= \frac{9\pi}{2} - \frac{\pi}{2} = \frac{8\pi}{2} = 4\pi$

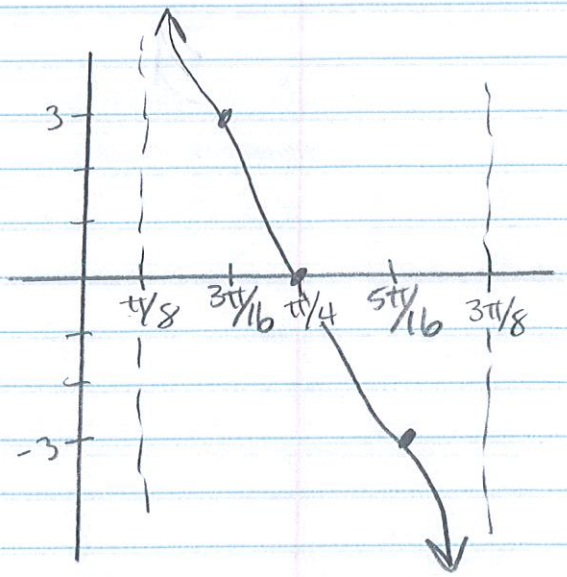
18. $y = -3\tan(4x - \pi)$

$4x - \pi = -\frac{\pi}{2}$ $\quad$ $4x - \pi = \frac{\pi}{2}$

$4x = -\frac{\pi}{2} + \frac{2\pi}{2}$ $\quad$ $4x = \frac{\pi}{2} + \frac{2\pi}{2}$

$\left(\frac{1}{4}\right) 4x = \frac{\pi}{2}\left(\frac{1}{4}\right)$ $\quad$ $\left(\frac{1}{4}\right) 4x = \frac{3\pi}{2}\left(\frac{1}{4}\right)$

$\boxed{x = \frac{\pi}{8}}$ $\quad$ $\boxed{x = \frac{3\pi}{8}}$



* Reflect