

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

Find the exact value of each expression.

1.  $\tan\left(\frac{\pi}{3}\right)$

2.  $\tan\left(\frac{\pi}{2}\right)$

3.  $\tan(\pi)$

4.  $\cot\left(\frac{\pi}{4}\right)$

5.  $\cot(0)$

6.  $\cot\left(\frac{\pi}{2}\right)$

7.  $\sin\left(\frac{7\pi}{6}\right)$

8.  $\sec\left(\frac{\pi}{2}\right)$

9.  $\csc\left(\frac{\pi}{3}\right)$

Find the approximate value of each expression to the nearest tenth.

10.  $\tan(1.56)$

11.  $\tan(1.58)$

12.  $\cot(0.002)$

13.  $\cot(-0.003)$

Determine the period of each function.

14.  $f(x) = \cot(\pi x)$

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

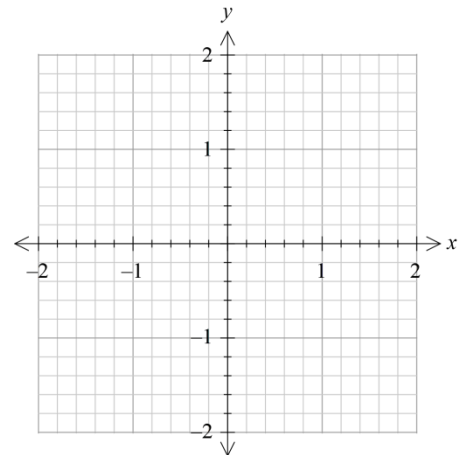
Sketch at least one cycle of the graph of each function. Determine the period and the equations of the vertical asymptotes. Make a table of the key points.

16.  $f(x) = \tan(\pi x)$

$x$	$f(x)$

period \_\_\_\_\_

asymptotes \_\_\_\_\_

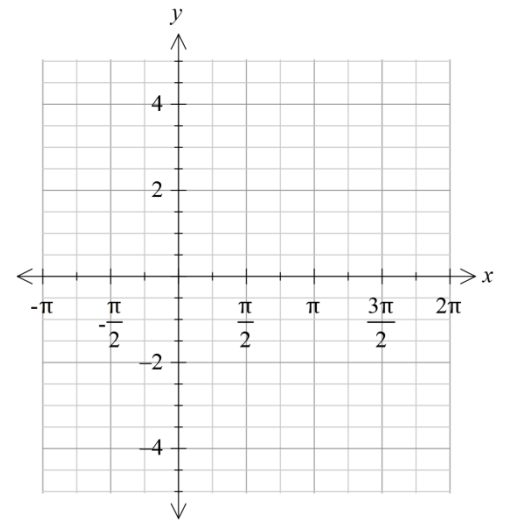


17.  $f(x) = -\tan\left(x - \frac{\pi}{2}\right)$

$x$	$f(x)$

period \_\_\_\_\_

asymptotes \_\_\_\_\_

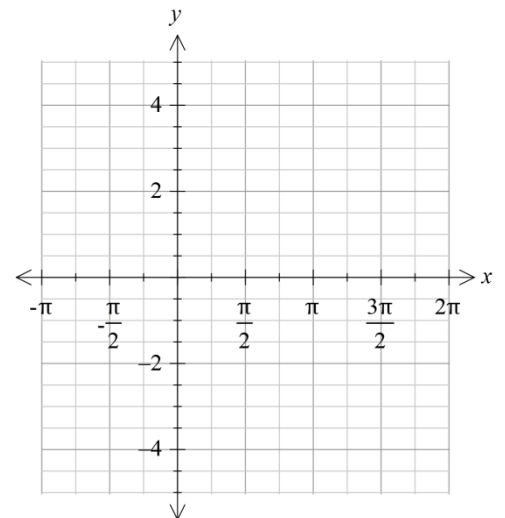


18.  $f(x) = \cot\left(x + \frac{\pi}{4}\right)$

$x$	$f(x)$

period \_\_\_\_\_

asymptotes \_\_\_\_\_

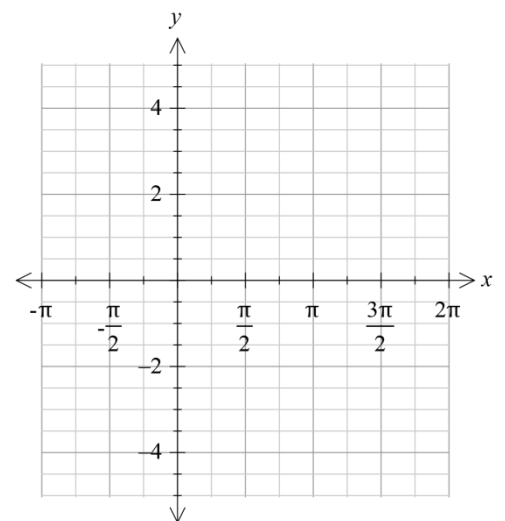


19.  $f(x) = 2 + \cot(x)$

$x$	$f(x)$

period \_\_\_\_\_

asymptotes \_\_\_\_\_



**Write the equation of each curve in its final position.**

20. The graph of  $y = \tan(x)$  is shifted  $\frac{\pi}{4}$  units to the right, stretched by a factor of 3, then translated 2 units upward.

21. The graph of  $y = \cot(x)$  is shifted  $\frac{\pi}{3}$  units to the left, stretched by a factor of 2, then translated 5 units downward.

**Let  $f(x) = \tan(x)$ ,  $g(x) = x + 3$ , and  $h(x) = 2x$ . Find the following. Show work!**

22.  $g\left(h\left(f\left(\frac{\pi}{2}\right)\right)\right)$

23.  $g\left(f\left(h(x)\right)\right)$

### **Review**

24. A worker on top of a 432-foot building spots the boss on the ground. The angle of depression for the line of sight to the boss is 28 degrees. How far from the building (to the nearest foot) is the boss?

Solve each triangle. Round your answers to the nearest tenth. Be sure to check for how many triangles there are first.

25.  $a = 24$  km,  $b = 28$  km,  $c = 19$  km

26.  $m\angle A = 67^\circ$ ,  $c = 34$  ft,  $a = 30$  ft

27.  $m\angle A = 44^\circ$ ,  $c = 26$  cm,  $a = 25$  cm

28. From a boat on the lake, the angle of elevation to the top of a cliff is  $12^\circ$ . If the base of the cliff is 1,366 feet from the boat, how high is the cliff?

29. The dimensions of a triangular flag are 15 inches by 24 inches by 29 inches. To the nearest tenth, what is the measure of the angle formed by the two shorter sides?