**Graph of f**

1. A portion of the graph of the function f is shown in the xy -plane, where f is the result of multiplicative transformation of the graph of $y = \tan x$. What is the period of f ?

2. The function h is given by $h(x) = 7 - 3 \tan(4x)$. What is the period of h ?

3. The function g is given by $g(\theta) = \tan\left(\frac{\theta}{3}\right)$. What is the period of g ?

4. The function k is given by $k(\theta) = \tan(\pi\theta)$. What is the period of k ?

5. The function p is given by $p(\theta) = \tan\left(\frac{\pi\theta}{4}\right)$. What is the period of p ?

6. The function j is given by $j(\theta) = \tan(2\theta)$. Which of the following gives the vertical asymptotes to the graph of j ?

- (A) $\frac{\pi}{2} + \pi k$, where k is an integer
- (B) $\pi + 2\pi k$, where k is an integer
- (C) $\frac{\pi}{4} + \frac{\pi}{2}k$, where k is an integer
- (D) $\frac{\pi}{4} + \pi k$, where k is an integer

7. The function f is given by $f(\theta) = \tan\left(\frac{1}{4}\theta\right)$. Which of the following gives the vertical asymptotes to the graph of f ?

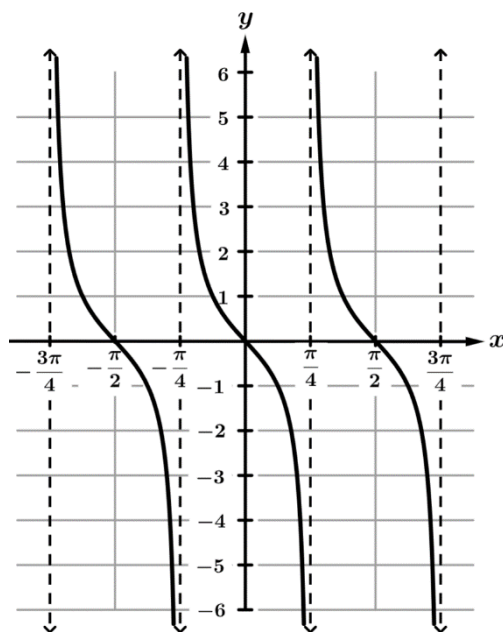
- (A) $\frac{\pi}{8} + \frac{\pi}{4}k$, where k is an integer
- (B) $\frac{\pi}{2} + \pi k$, where k is an integer
- (C) $2\pi + 4\pi k$, where k is an integer
- (D) $4\pi + 8\pi k$, where k is an integer

8. The function g is given by $g(\theta) = \tan(\pi\theta)$. Which of the following gives the vertical asymptotes to the graph of g ?

- (A) $\frac{\pi}{2} + \pi k$, where k is an integer
- (B) $\pi + 2\pi k$, where k is an integer
- (C) $\frac{1}{2} + k$, where k is an integer
- (D) $\frac{1}{2} + 2k$, where k is an integer

9. The function h is given by $h(\theta) = \tan\left(\left(\theta - \frac{\pi}{2}\right)\right)$. Which of the following gives the vertical asymptotes to the graph of h ?

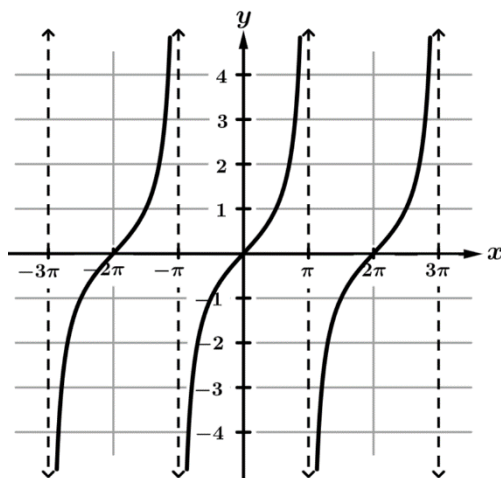
- (A) $\frac{\pi}{2} + \pi k$, where k is an integer
- (B) $\frac{\pi}{2} + \frac{3\pi}{2}k$, where k is an integer
- (C) πk , where k is an integer
- (D) $\pi + \frac{3\pi}{2}k$, where k is an integer



Graph of f

10. The graph of the function f is given in the xy -plane. If $f(x) = a \tan(bx)$, where a and b are constants, which of the following is true?

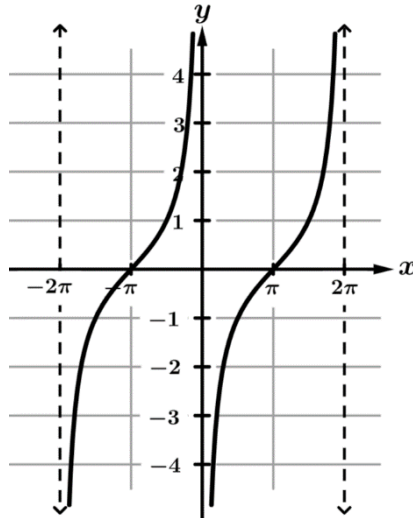
- (A) $a > 0$ and $b > 1$ (B) $a > 0$ and $0 < b < 1$ (C) $a < 0$ and $b > 1$ (D) $a < 0$ and $b < 1$



Graph of g

11. The graph of the function g is given in the xy -plane. If $g(x) = a \tan(bx)$, where a and b are constants, which of the following is true?

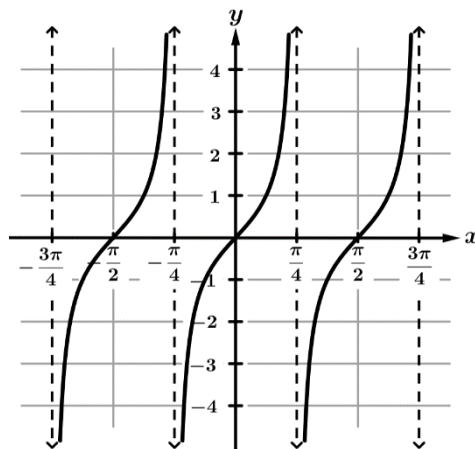
- (A) $a > 0$ and $b > 1$ (B) $a > 0$ and $b < 1$ (C) $a < 0$ and $b > 1$ (D) $a < 0$ and $b < 1$



Graph of h

12. The graph of the function h is given in the xy -plane. If $h(x) = \tan(b(x+c))$, where b and c are constants, what are the values of b and c ?

- (A) $b = \frac{1}{2}$ and $c = -\frac{\pi}{2}$ (B) $b = \frac{1}{2}$ and $c = -\pi$ (C) $b = 2$ and $c = -\frac{\pi}{2}$ (D) $b = 2$ and $c = -\pi$



Graph of k

13. The graph of the function k is given in the xy -plane. Which of the following could be the expression for $k(x)$?

- (A) $k(x) = -\tan(4x)$ (B) $k(x) = \tan\left(\frac{x}{2}\right)$ (C) $k(x) = \tan(2x)$ (D) $k(x) = \tan\left(x + \frac{\pi}{4}\right)$

14. In the xy -plane, an angle θ is in standard position. The slope of the terminal ray of angle θ is -1 . Which of the following could be the measure of angle θ ?

- (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) $\frac{3\pi}{4}$ (D) $\frac{3\pi}{2}$

15. In the xy -plane, an angle θ is in standard position. The slope of the terminal ray of angle θ is undefined. Which of the following could be the measure of angle θ ?

- (A) $\frac{\pi}{4}$ (B) π (C) $\frac{3\pi}{2}$ (D) 2π

16. In the xy -plane, an angle θ is in standard position. The slope of the terminal ray of angle θ is $\sqrt{3}$. Which of the following could be the measure of angle θ ?

- (A) $\frac{\pi}{6}$ (B) $\frac{2\pi}{3}$ (C) $\frac{4\pi}{3}$ (D) $\frac{11\pi}{6}$

17. In the xy -plane, an angle θ is in standard position. The slope of the terminal ray of angle θ is 0 . Which of the following could be the measure of angle θ ?

- (A) $\frac{\pi}{2}$ (B) $\frac{3\pi}{4}$ (C) π (D) $\frac{3\pi}{2}$

18. In the xy -plane, an angle θ is in standard position with a measure of $\theta = \frac{\pi}{6}$. Which of the following is true?

- (A) The terminal ray of the angle θ has a slope of $\frac{1}{2}$.
(B) The terminal ray of the angle θ has a slope of $\frac{1}{\sqrt{3}}$.
(C) The terminal ray of the angle θ has a slope of $\frac{\sqrt{3}}{2}$.
(D) The terminal ray of the angle θ has a slope of $\sqrt{3}$.

19. In the xy -plane, an angle θ is in standard position with a measure of $\theta = \frac{5\pi}{4}$. Which of the following is true?

- (A) The terminal ray of the angle θ has a slope of $-\frac{\sqrt{2}}{2}$.
(B) The terminal ray of the angle θ has a slope of $\frac{\sqrt{2}}{2}$.
(C) The terminal ray of the angle θ has a slope of -1 .

(D) The terminal ray of the angle θ has a slope of 1.

Directions: Find the exact values of the following expressions if possible.

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

21. $\tan\left(\frac{3\pi}{4}\right)$

22. $\tan\left(\frac{2\pi}{3}\right)$

23. $\tan\left(\frac{5\pi}{3}\right)$

24. $\tan\left(\frac{11\pi}{6}\right)$

25. $\tan(2\pi)$

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

27. $\tan\left(\frac{5\pi}{4}\right)$

28. $\tan\left(\frac{7\pi}{3}\right)$