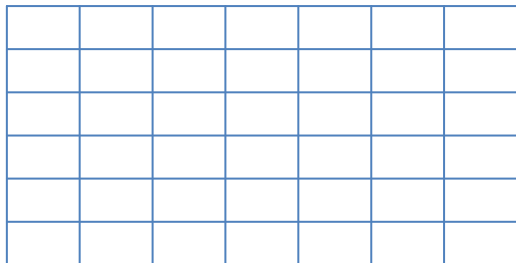


Non-Calculator

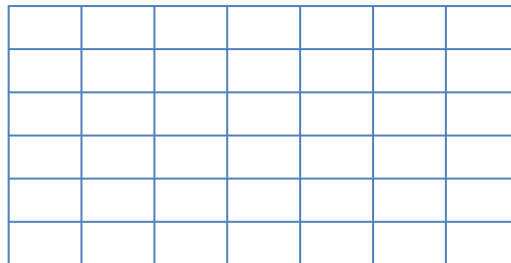
Show all work for credit!!

Graph each function without a calculator. State the (a) amplitude, (b) period, (c) phase shift and (d) vertical shift. Label each axis.

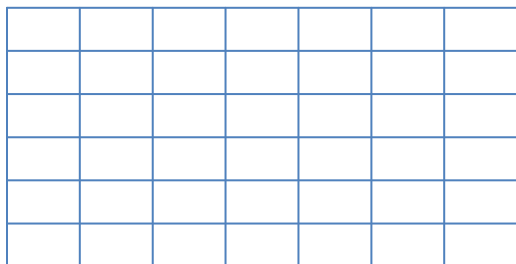
1. $y = \tan\left(\frac{x}{3}\right)$



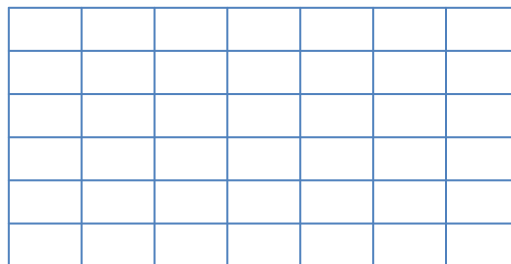
2. $y = \sec x$



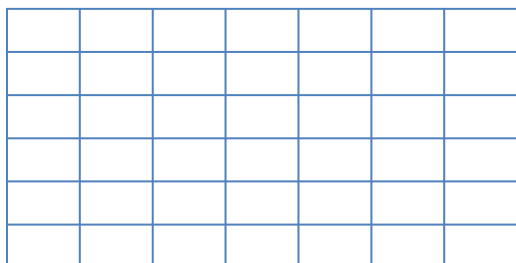
3. $y = 5 \cos(4x) - 2$



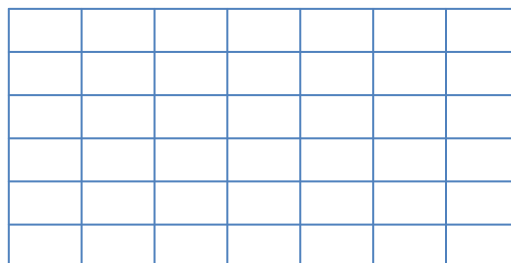
4. $y = \frac{1}{3} \sin\left(x - \frac{\pi}{4}\right)$



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

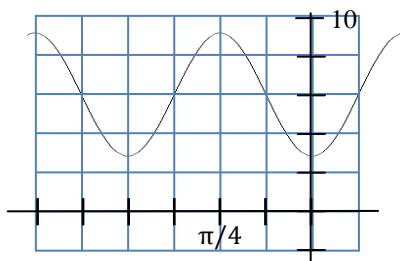


6. $y = 2 \sin(3x + \pi) - 4$



7. Write the equation(s) of the cosine function with amplitude 5, period 3π , phase shift $-\frac{\pi}{6}$, and vertical shift of 1.

8. Write the equation of the function shown below...



Find the exact value. Express your angle answers in radian measure.

9. $\cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$

10. $\sin^{-1}(-1)$

11. $\arctan(\sqrt{3})$

12. $\sin\left[\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]$

13. $\cos^{-1}\left[\cos\left(\frac{4\pi}{3}\right)\right]$

14. $\arcsin\left[\tan\left(\frac{3\pi}{4}\right)\right]$

15. Find an algebraic expression equivalent to $\sin(\arccos 3x)$.

Calculator Allowed

16. A plane is 8000 feet above the ground when it begins its final approach to a runway. If the ground distance to the end of the runway is 158400 feet, what is the angle of descent to the end of the runway?

17. Two boats are observed from a tower 75 meters above a lake. The angles of depression are 12° and 7° . How far apart are the boats?

18. The bearings of two points on the shore from a boat are 115° and 123° . The two points on shore are 855 ft apart, the shore is straight and runs north-south.

- a) How far is the boat from the shore?
- b) How far is the boat from the nearest point on shore?