We have looked at graphs of the form $\qquad f(t) = a \sin t + d$

Where "a" measures the steepness of the graph
if a >1 it's a vertical stretch
if a< 1 it's a vertical compression by a factor of "a"

Where "d" shifts the graph up or down vertically by "d" units.

Now let's consider $\quad f(t) = a \sin bt + d \quad$ where "b' will effect the period of the graph. Before "b" was 1 resulting in a period of 2π.

By definition the period for sine and cosine is $= \dfrac{2\pi}{|b|}$

The increments (sine: on, above, on, below, on OR cosine: above, on, below, on, above) on the x axis are found by taking the Period and dividing it into 4 increments. So now what you will do, is take $\dfrac{2\pi}{|b|}$ and that number is going to be divided into 4 to find the increments….. for example:
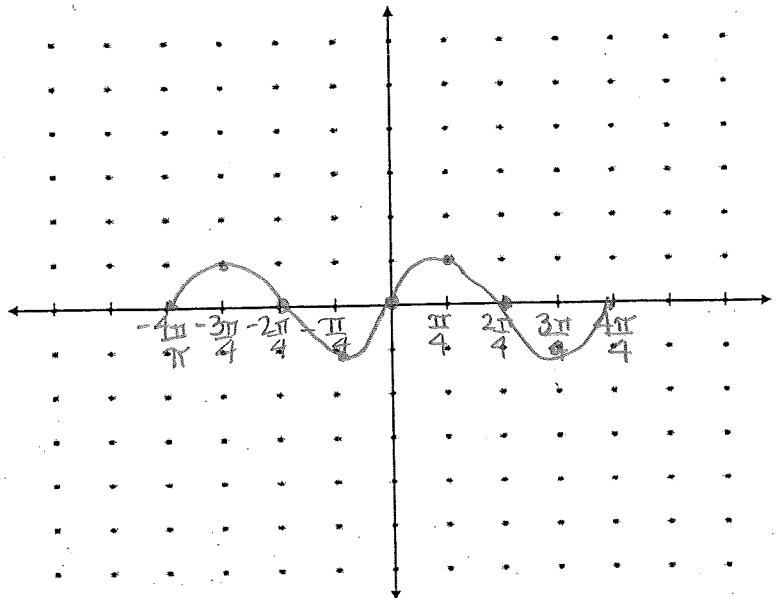
Graph 2 full periods:

$f(t) = \sin 2t$

$y = 1 \sin (2)x + 0$

Amplitude: _____ 1 _____
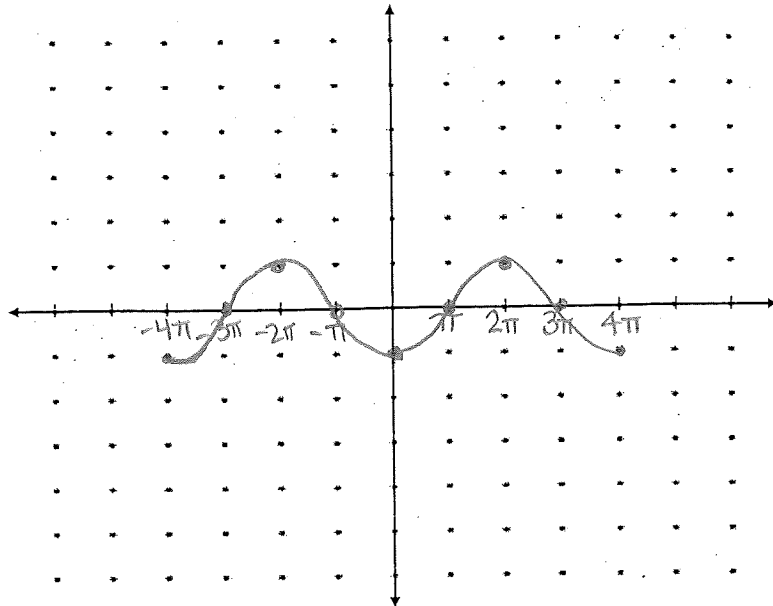
Period: $\dfrac{2\pi}{2} = \pi$

Increments: $\dfrac{\pi}{4}$

V. Shift: _____ 0 _____

Graph $f(t) = -\cos \dfrac{1}{2}t + 0$ ← b

Amplitude: 1

Period: $\dfrac{2\pi}{b} = \dfrac{2\pi}{\frac{1}{2}} = \boxed{4\pi}$

Increments: $\dfrac{4\pi}{4} = \pi$

V. Shift: _____

When b> 1, you will have a horizontal compression by a factor of 1/b.
When b< 1, you will have a horizontal stretch by a factor of 1/b.

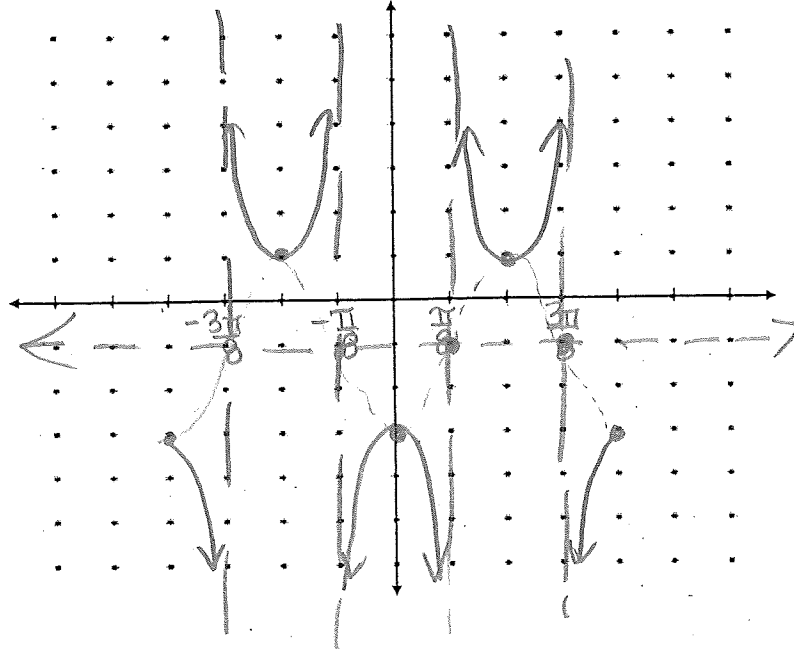Graph $f(t) = 3\sin 4t + 2$ ← $b = 4$

Amplitude: 3

Period: $\dfrac{2\pi}{4} = \dfrac{\pi}{2}$

Increments: $\dfrac{\pi}{2} \cdot \dfrac{1}{4} = \dfrac{\pi}{8}$

V. Shift: 2
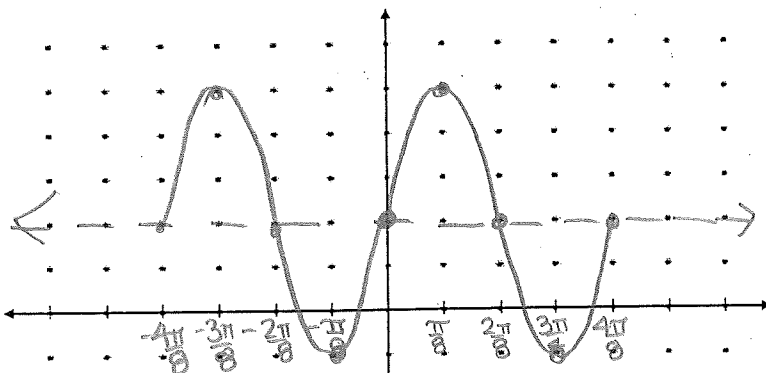
$y = -2\cos 4t - 1$

Graph $f(t) = -2\sec 4t - 1$

Amplitude: 2

Period: $\dfrac{2\pi}{4} = \dfrac{\pi}{2}$

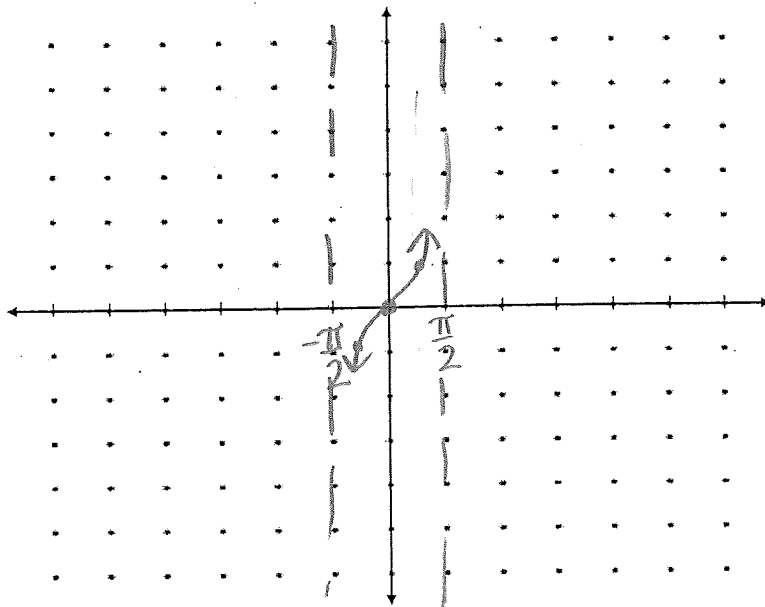Increments: $\dfrac{\pi}{2} \cdot \dfrac{1}{4} = \dfrac{\pi}{8}$

V. Shift: $1\ down$

For the tan and cot graphs, the period was every π and not 2π.

By definition the period for tan and cot $= \dfrac{\pi}{|b|}$.

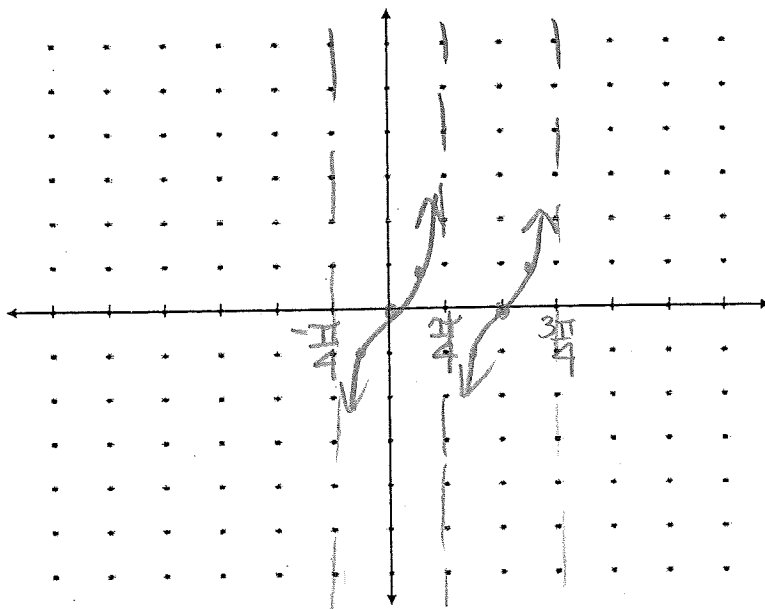The increments are $\dfrac{P}{|b|}$

Graph $f(t) = \tan t$

Steepness : ___1___

Period: ___π___

Increments: ___$\dfrac{\pi}{2}$___

V. Shift: ___0___

$f(t) = \tan 2t$

Steepness : ___1___

Period: ___$\dfrac{\pi}{b} = \dfrac{\pi}{2}$___

Increments: ___$\dfrac{\pi}{2} \cdot \dfrac{1}{2} = \dfrac{\pi}{4}$___

V. Shift: ___0___

Graph $f(t) = 2\tan 3t + 1$

(with label b pointing to 3, and arrow pointing to 2)
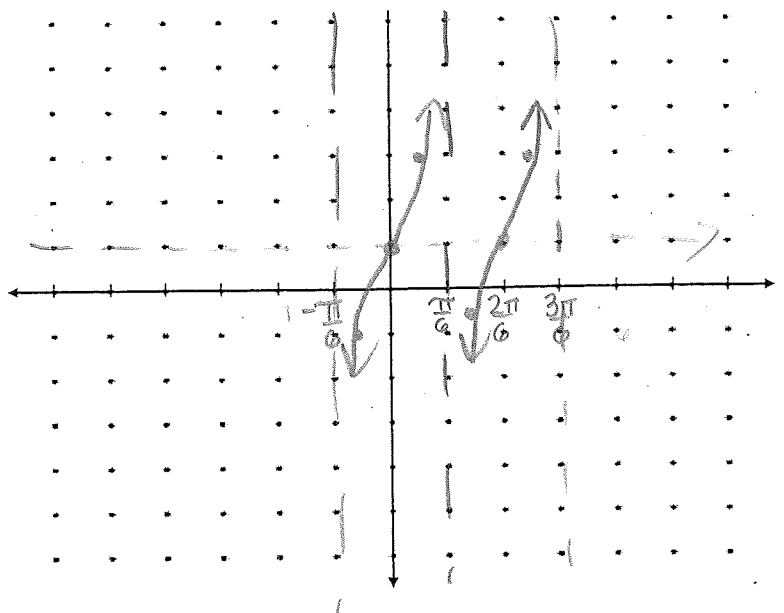
Steepness: 2

Period: $\dfrac{\pi}{3}$

Increments: $\dfrac{\pi}{3} \cdot \dfrac{1}{2} = \dfrac{\pi}{6}$
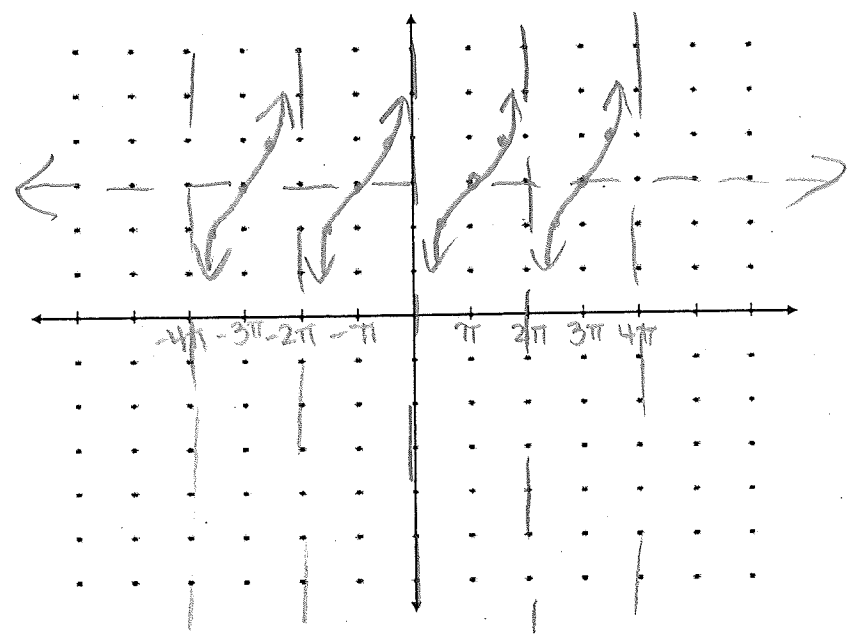
V. Shift: up 1

Graph $f(t) = -\cot\dfrac{1}{2}t + 3$

Steepness : 1

Period: $\dfrac{\pi}{\frac{1}{2}} = 2\pi$

Increments: $\dfrac{2\pi}{2} = \pi$

V. Shift: up 3

$\dfrac{\tan}{\cot} \quad \dfrac{\pi}{b} =$

Example: Write an equation for a sine function with the given information:

$\dfrac{2\pi}{b}$ (circled, labeled b)

a

d

Amplitude of $\dfrac{1}{2}$, and period is $\dfrac{\pi}{2}$ and shifted 3 units down.

$f(t) = a\sin bt + d$

$f(t) = \dfrac{1}{2}\sin 4t - 3$

$\dfrac{2\pi}{b} = \dfrac{\pi}{2}$

$\pi b = 4\pi$

$b = 4$

PreCalc 7.3 Homework

Name_____

For #'s 1-8 , find **all** values for which the given statement is true.

1. $\cos t = -\dfrac{\sqrt{2}}{2}$

1. _____

2. $\tan t = -\sqrt{3}$

2. _____

3. $\cos t = -\dfrac{1}{2}$

3. _____

4. $\sin t = -\dfrac{\sqrt{3}}{2}$

4. _____

5. $\cos t = -1$

5. _____

6. $\tan t = -1$

6. _____

7. $\sin t = 0$

7. _____

8. $\tan t = \dfrac{\sqrt{3}}{3}$

8. _____

In 9-17, graph two complete periods!!!
LABEL YOUR GRAPHS! BE NEAT!!

9. Graph $f(t) = -3\cos t + 2$

Amplitude: _____

Period: _____
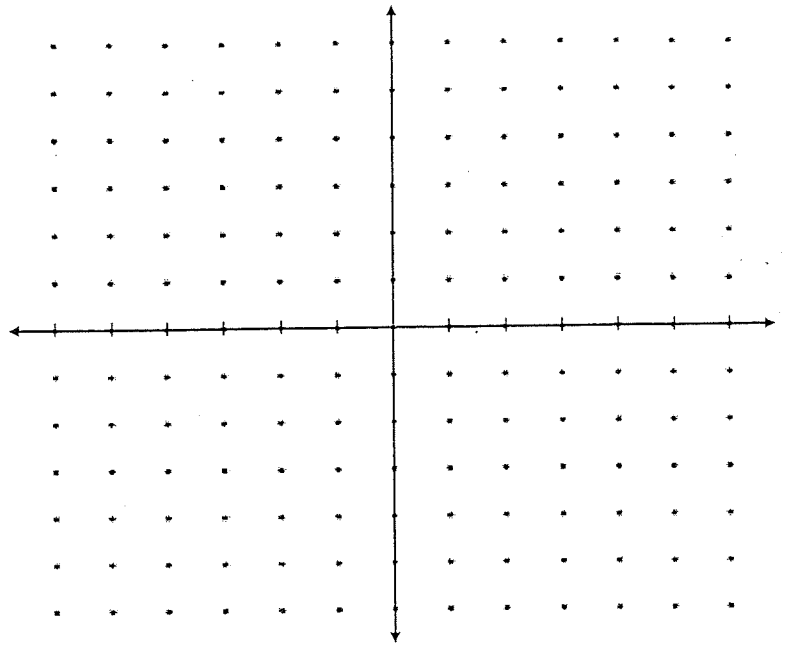
Increments: _____

V. Shift: _____
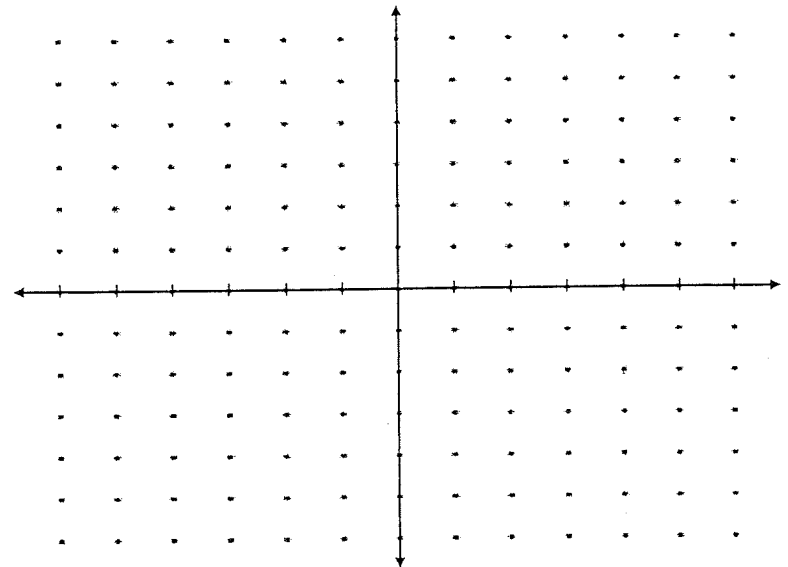
10. Graph $f(t) = 4\cos\dfrac{t}{2} + 1$
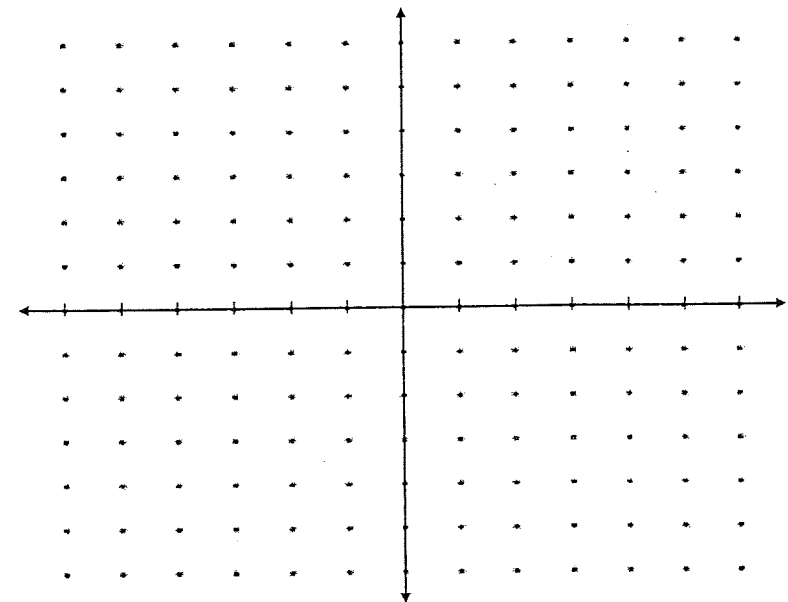
Amplitude: _____

Period: _____

Increments: _____

V. Shift: _____

11. Graph $f(t) = 2\sin \pi t$
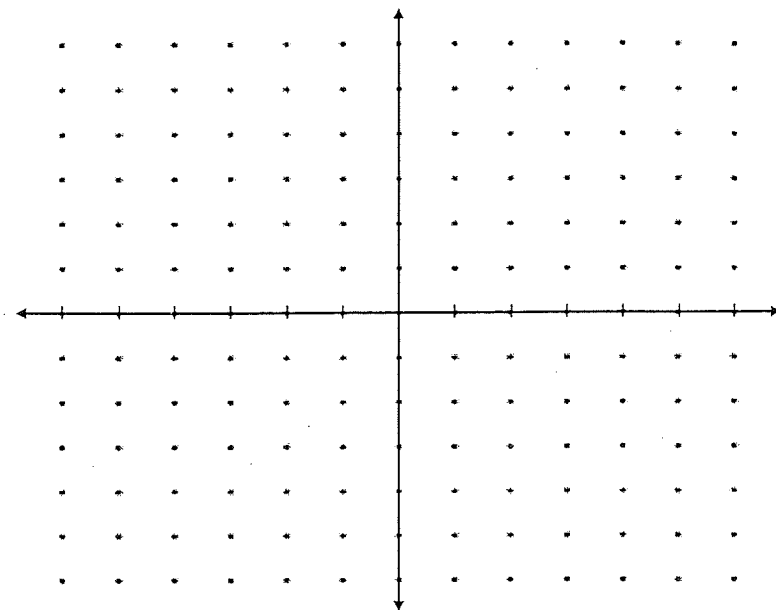
Amplitude: _____

Period: _____

Increments: _____

V. Shift: _____

12. Graph $f(t) = -3\cos 2t + 2$
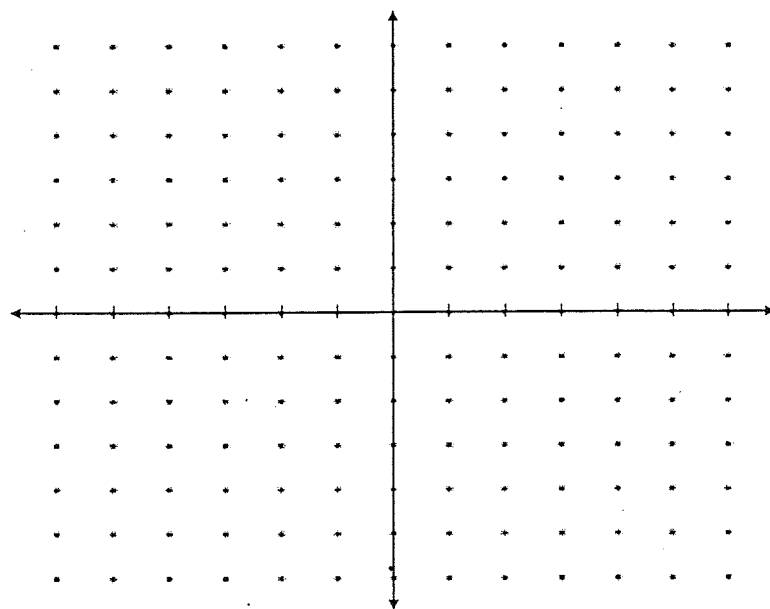
Amplitude: _____

Period: _____

Increments: _____

V. Shift: _____

13. Graph $f(t) = 2\tan 3t$

Steepness: _____

Period: _____

Increments: _____

V. Shift: _____

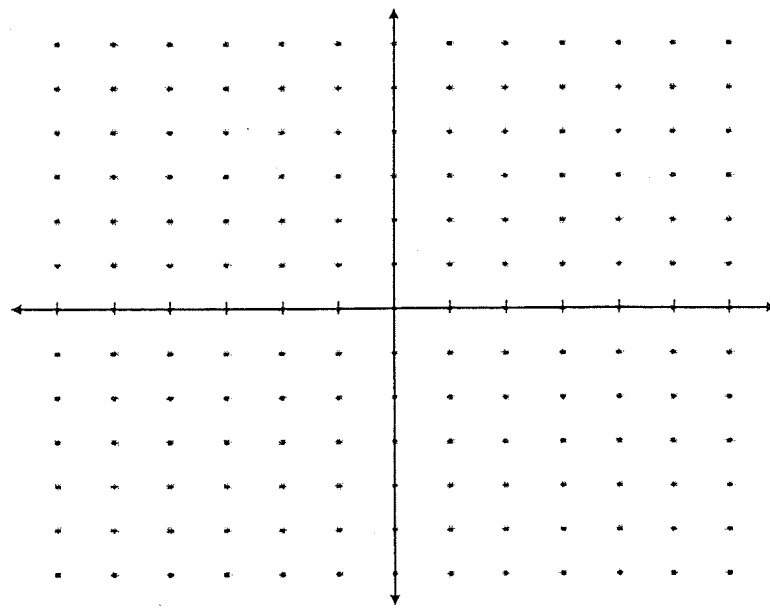14. Graph $f(t) = \cot\dfrac{\pi}{2}t$
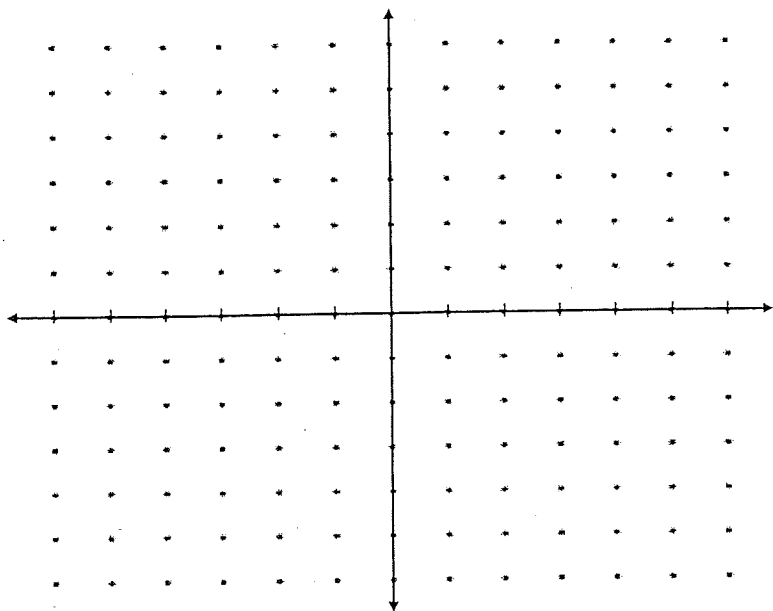
Steepness: _____

Period: _____

Increments: _____

V. Shift: _____

15. Graph $f(t) = \dfrac{1}{2}\tan \pi t + 2$

Steepness: _____

Period: _____

Increments: _____

V. Shift: _____
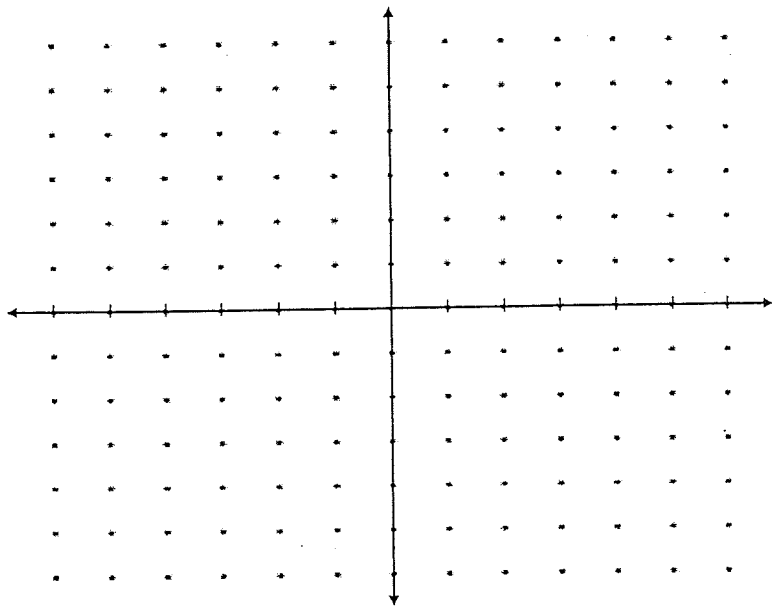
16. Graph $f(t) = 2\cos \pi t$

Amplitude: _____

Period: _____

Increments: _____

V. Shift: _____

17. Graph $f(t) = 3\sin 2\pi t$

Amplitude: _____

Period: _____

Increments: _____

V. Shift: _____