

Notes 11.1 Periodic Functions and Their Properties

Graphical and Numerical Approaches

Periodic Function: A function that returns to the same value at regular intervals. (the graph repeats itself)

Period: The distance along the horizontal axis that the function must travel before it starts to repeat itself.

Amplitude: The height from the midline of the function to its maximum or minimum value

1. Use the graph to answer each question.

a. Is the function periodic? If not, give a reason?

Yes

b. If possible, state the following:

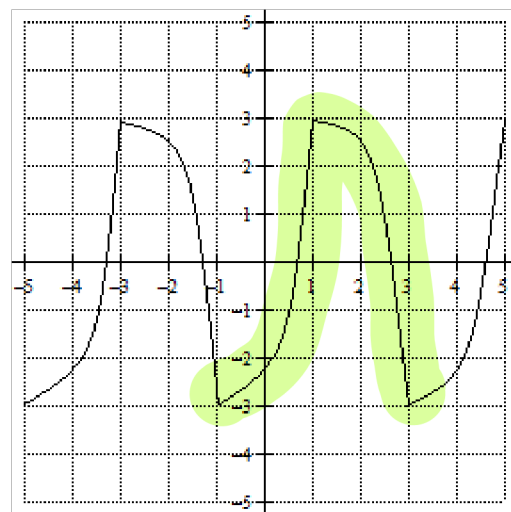
• Domain: \mathbb{R}

• Range: $[-3, 3]$

• Period: 4

• Amplitude: 3

• Midline: $y = 0$



2. Use the graph to answer each question.

a. Is the function periodic? If not, give a reason?

Yes

b. If possible, state the following:

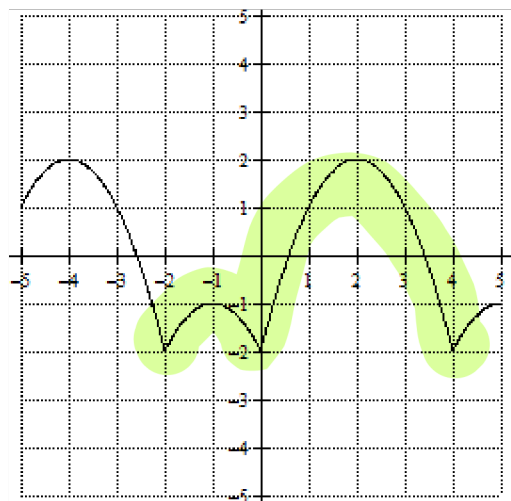
• Domain: \mathbb{R}

• Range: $[-2, 2]$

• Period: 6

• Amplitude: 2

• Midline: $y = 0$



3. Use the graph to answer each question.
 a. Is the function periodic? If not, give a reason?

No, the graph's height continues to increase.

- b. If possible, state the following:

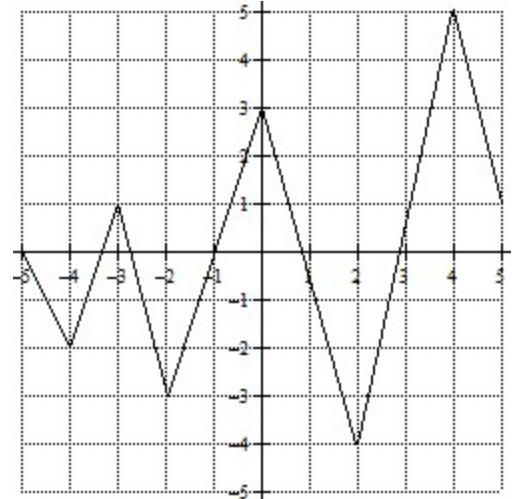
• Domain: \mathbb{R}

• Range: \mathbb{R}

• Period: ~~X~~

• Amplitude: ~~X~~

• Midline: ~~X~~



4. Use the graph to answer each question.
 a. Is the function periodic? If not, give a reason?

Yes

- b. If possible, state the following:

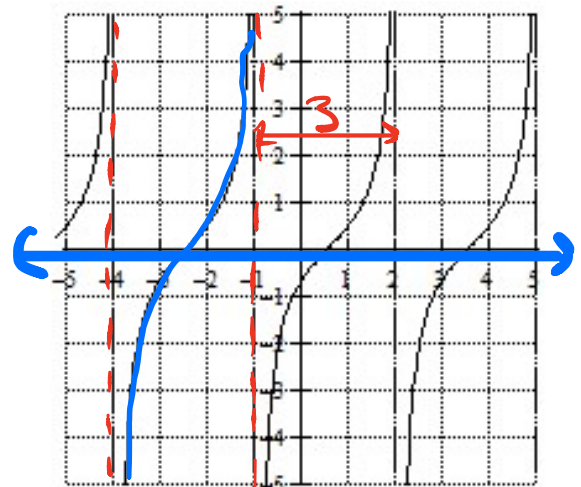
• Domain: \mathbb{R} except $(2 + 3n)$ where $n \in \mathbb{Z}$
amplitude Period

• Range: \mathbb{R}

• Period: 3

• Amplitude: ~~X~~

• Midline: $y = 0$



5. Use the graph to answer each question.
- Is the function periodic? If not, give a reason?

Yes

- b. If possible, state the following:

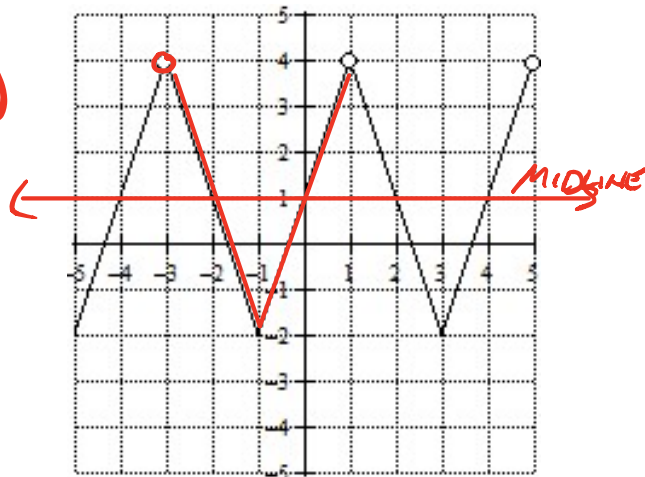
- Domain:

\mathbb{R} except $(1+4n)$
where $n \in \mathbb{Z}$

- Period: 4

- Range: $[-2, 4)$

- ? • Amplitude: 3



- Midline: $y = 1$

6. The table below shows values of one cycle of a periodic function, $f(x)$. The graph of $f(x)$ consists of straight-line segments that connect the consecutive points in the table.

x	-4	0	1	3
$f(x)$	4	2	-2	4

- a. Based on the values in the table, explain how you know that this is one cycle of a continuous periodic function.

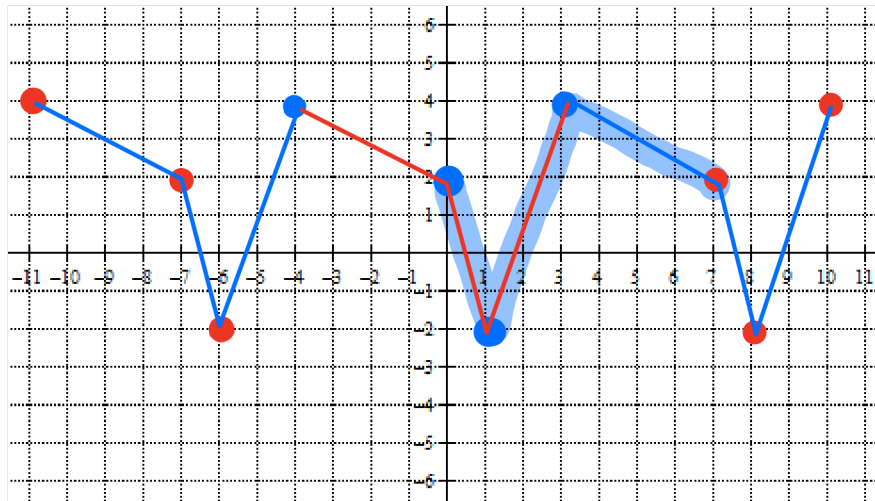
I am assuming the table is one cycle because $f(x)$ = the same value at $x = -4$ and $x = 3$

- b. Identify the period and amplitude of $f(x)$. Justify your answers.

$$P = x_{\text{END}} - x_{\text{BEGIN}} = 3 - (-4) = 7$$

$$\text{Amp} = \frac{y_{\text{max}} - y_{\text{min}}}{2} = \frac{4 - (-2)}{2} = \frac{6}{2} = 3$$

- c. Sketch a graph of $f(x)$ on the interval $-11 \leq x \leq 10$.



- d. What are the values of $f(15)$ and $f(-77)$? Show your work.

$$f(7+7+1) = f(1) = -2$$

$$f(14+1) = f(1) = -2$$

$$f(-7-7-7-7-7-7-7-7-7-7-7+0) = 2$$

$$f(-77) = f(0) = 2$$

- e. What are the values of $f(64)$ and $f(-25)$? Show your work.

$$f(64) = f(63+1) = f(1) = -2$$

$$f(-25) = f(-28+3) = f(3) = 4$$