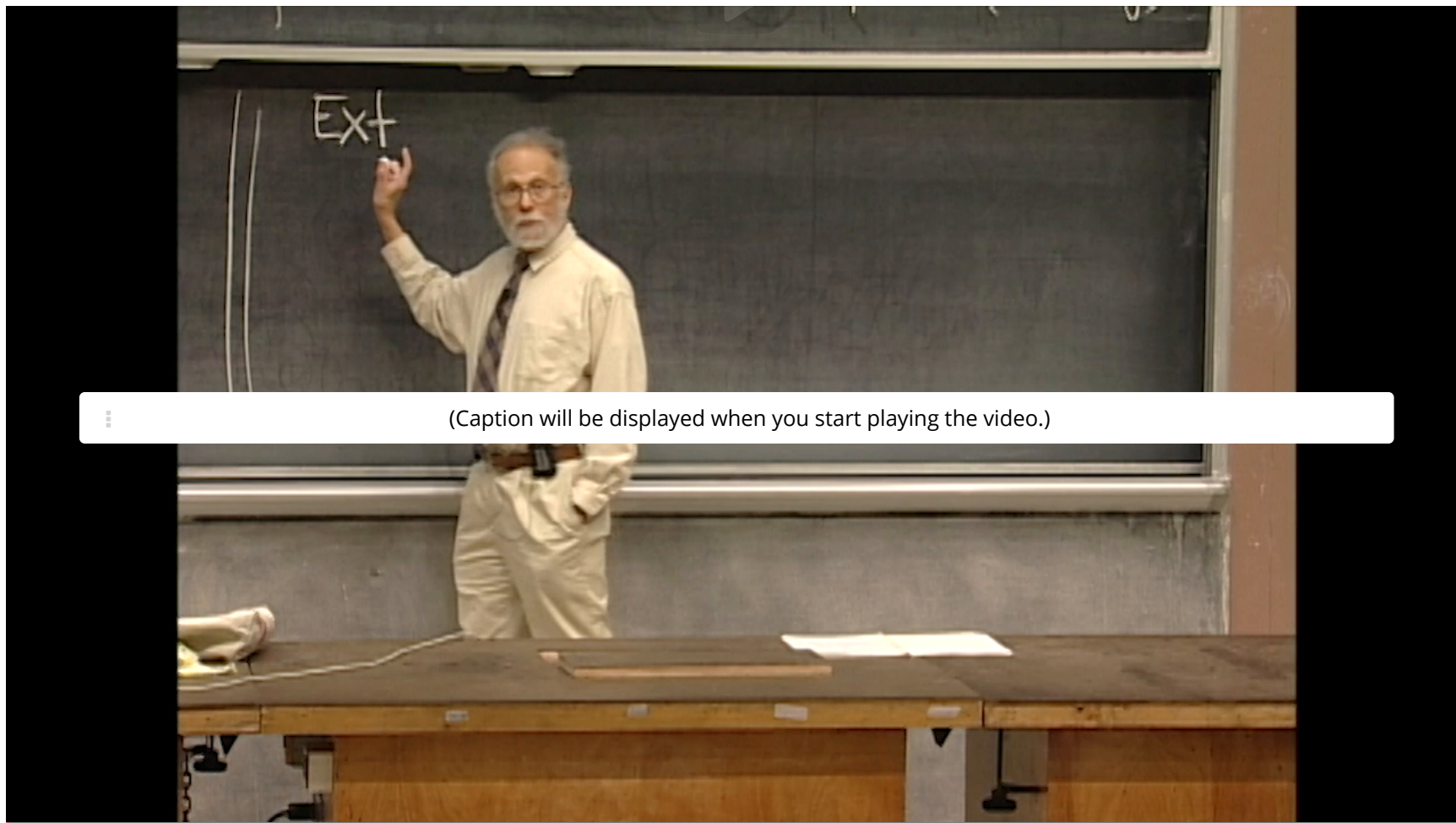


[Course](#) > [Unit 1: Fourier Series](#) > [2. Properties of Fourier Series \(of Period \$2L\$ \)](#)

9. When a function is defined on a
> finite interval (not periodic)

9. When a function is defined on a finite interval (not periodic) Periodic extensions





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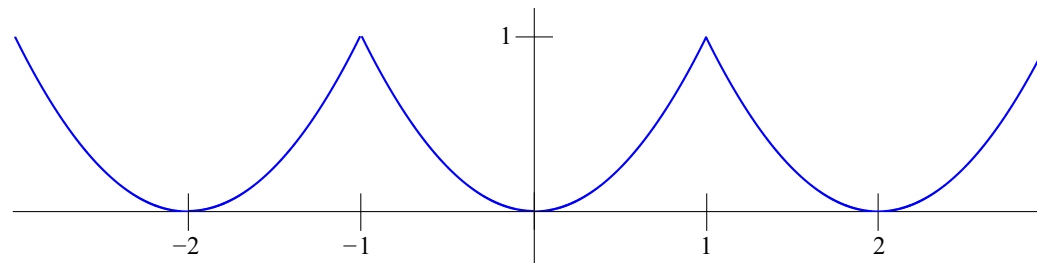


You can use a Fourier series expansion any time you have a function $f(t)$ defined on a finite interval $[0, L]$. First you create a periodic extension of this function defined everywhere, and then find the Fourier series of the periodic function. (In order to simplify the Fourier series, we typically choose to extend our function to be either even or odd, so that we end up with a cosine or sine series.)

Example 9.1 Consider the function $f(t) = t^2$ defined on the interval $[0, 1]$.

The even periodic extension is the period 2 function defined by

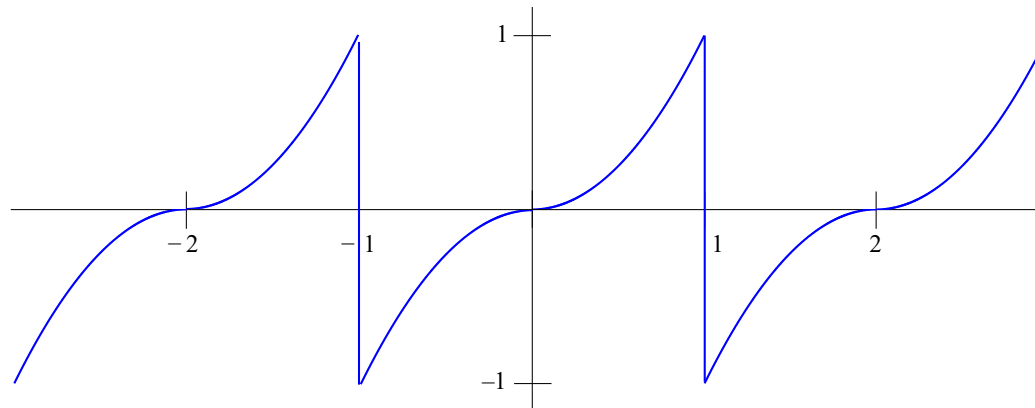
$$f(t) = t^2, \quad -1 \leq t \leq 1.$$



The odd periodic extension is the period 2 function defined by

$$f(t) = \begin{cases} t^2 & 0 < t < 1 \\ -t^2 & -1 < t < 0 \end{cases}.$$





Sketch the odd periodic extension

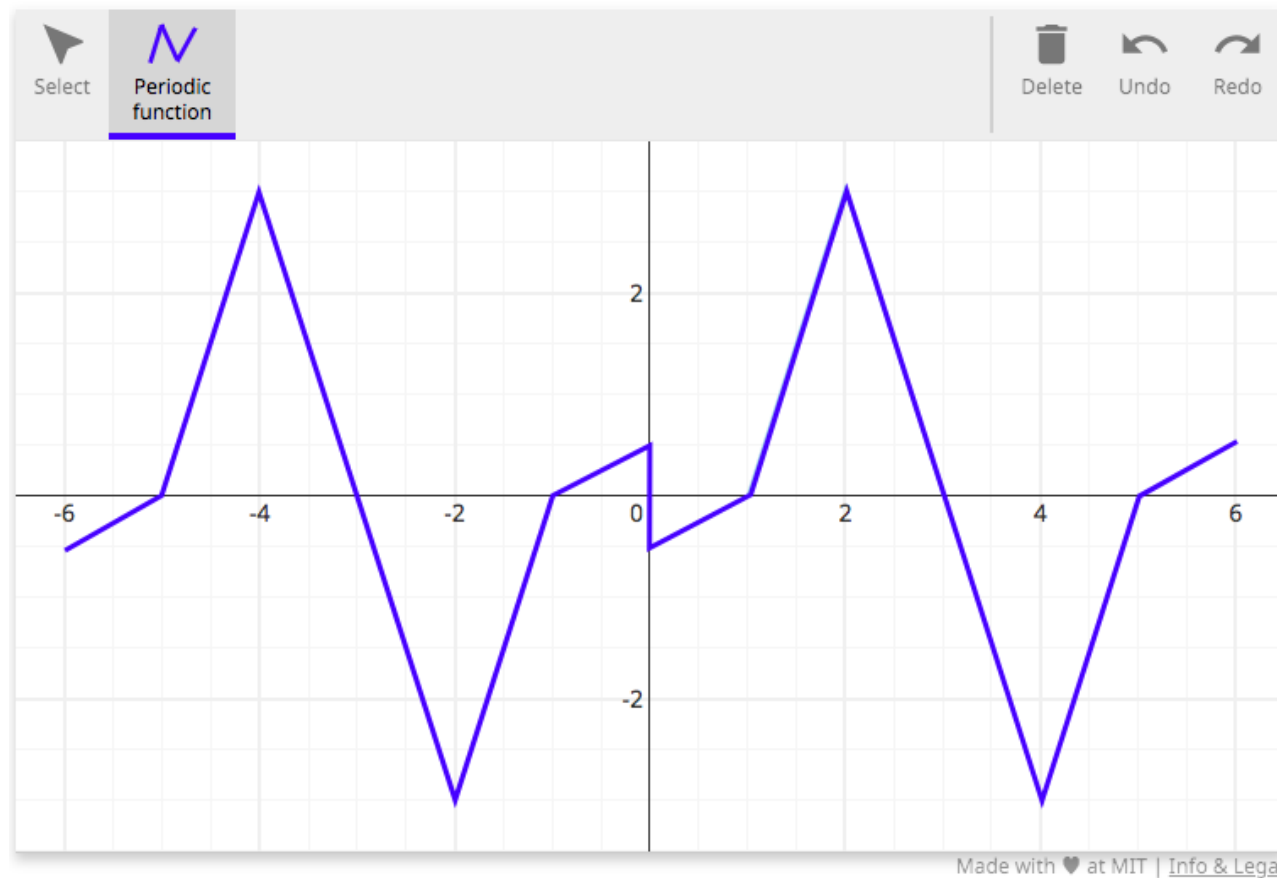
1/1 point (graded)

Below you see the graph of the function $g(x)$ defined on the interval $[0, 3]$, which is piecewise defined

$$g(x) = \begin{cases} x/2 - 1/2 & 0 < x < 1 \\ 3x - 3 & 1 < x < 2 \\ -3x + 9 & 2 < x < 3 \end{cases}$$

Sketch the odd periodic extension of this function over the interval $[-6, 6]$. Be sure to sketch over the outline.





Submit

You have used 3 of 10 attempts

i Answers are displayed within the problem

Sketching the even periodic extension

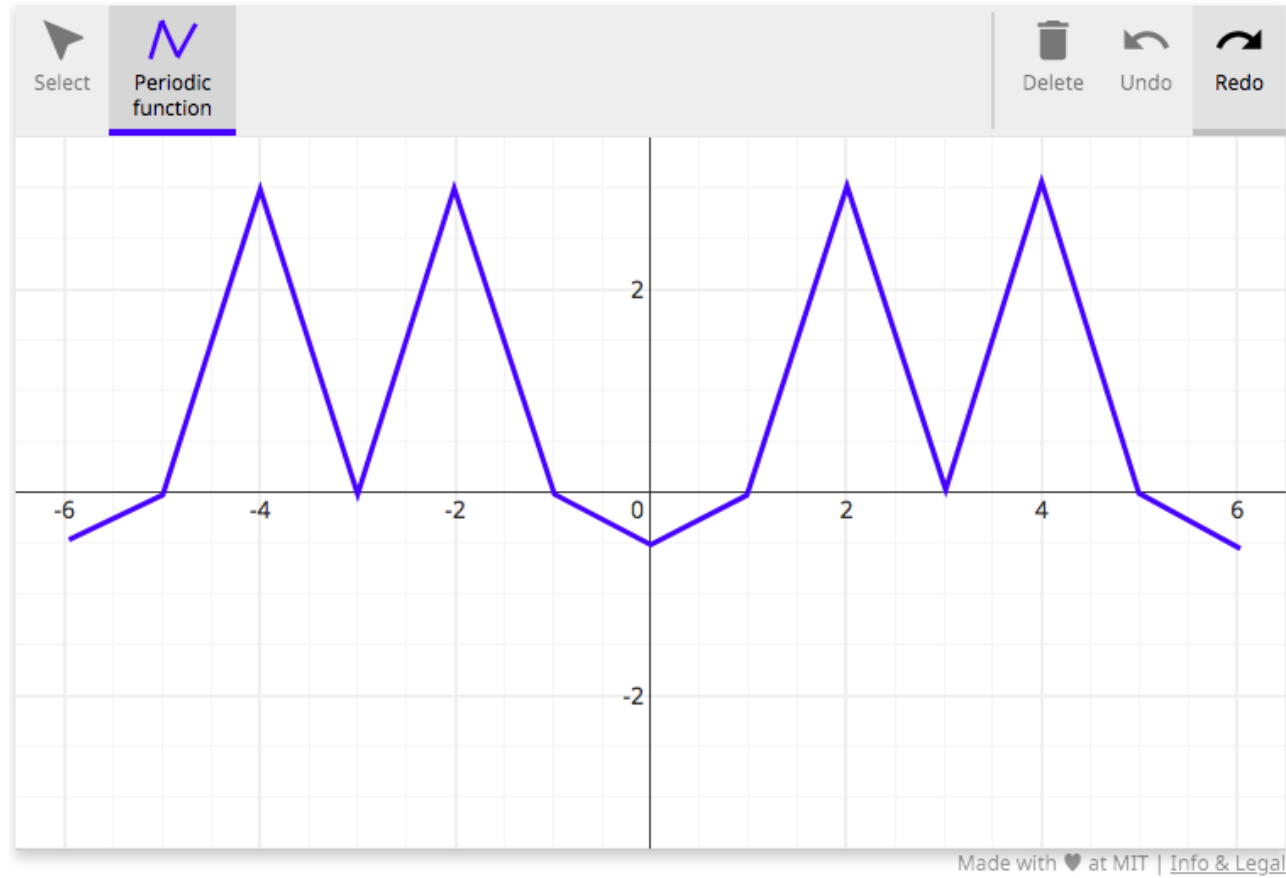
1/1 point (graded)



Good job!

Solution:

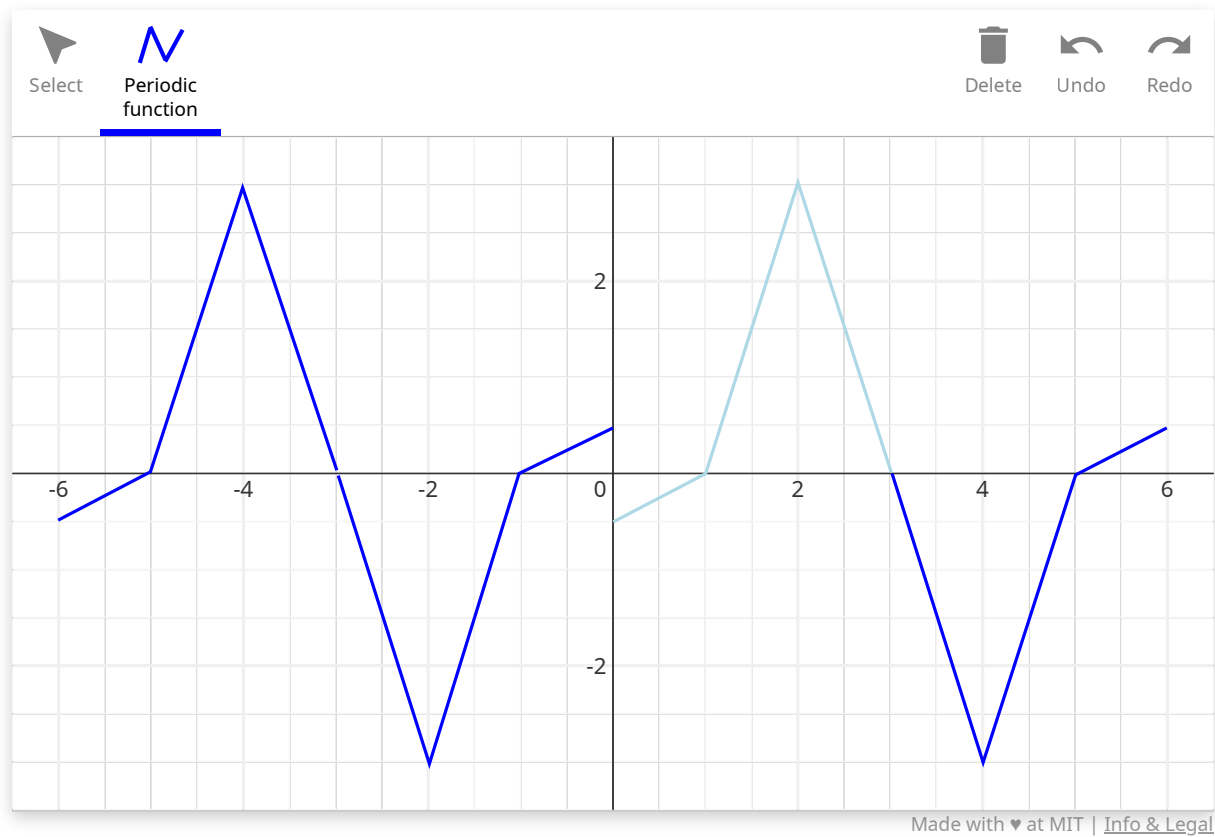
The sketch of the solution is shown below.



Submit

You have used 4 of 10 attempts





Answer: .




Good job!

Solution:

The sketch of the solution is shown below.



 Answers are displayed within the problem

9. When a function is defined on a finite interval (not periodic)

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my draw

discussion posted about a month ago by [GauthierDietrich](#)

Hi. my draw is correct but it count as wrong. I don't know why.

This post is visible to everyone.

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2 responses

[uzair iqbal96](#)

about a month ago - endorsed about a month ago by [jfrench](#) (Staff)

Remember that you have to draw over the interval $[-6,6]$ and not over $[-3,3]$.

yes I did it but nevertheless it count false I don't understand

posted about a month ago by [GauthierDietrich](#)

it is mentioned in problem "be sure to sketch over the outline". you will have to select the given function as well along with the extension.

posted about a month ago by [uzair iqbal96](#)



Oh I got it thanks



posted about a month ago by [GauthierDietrich](#)

Thanks uzair I'd missed that one



posted 15 days ago by [Ruhagura](#)

Add a comment



[GutiCamilo](#)

about a month ago



Can someone help me with the odd function? I try to draw the same drawing as in the even function (but inverted) but I still manage to get it wrong

Remember the definition of an odd function $f(x) = -f(-x)$. Try plotting some points first and then connect!



posted about a month ago by [jffrench](#) (Staff)

the odd functions are symmetric with respect to the coordinate origin



posted about a month ago by [DBCroatia](#)

just rotate the right hand period around anti-clockwise 180 degrees so that it's upside down.



posted about a month ago by [johnno76](#)



Good suggestions for ways to think about this @DBCroatia and @johno76



posted 15 days ago by [jfrench](#) (Staff)

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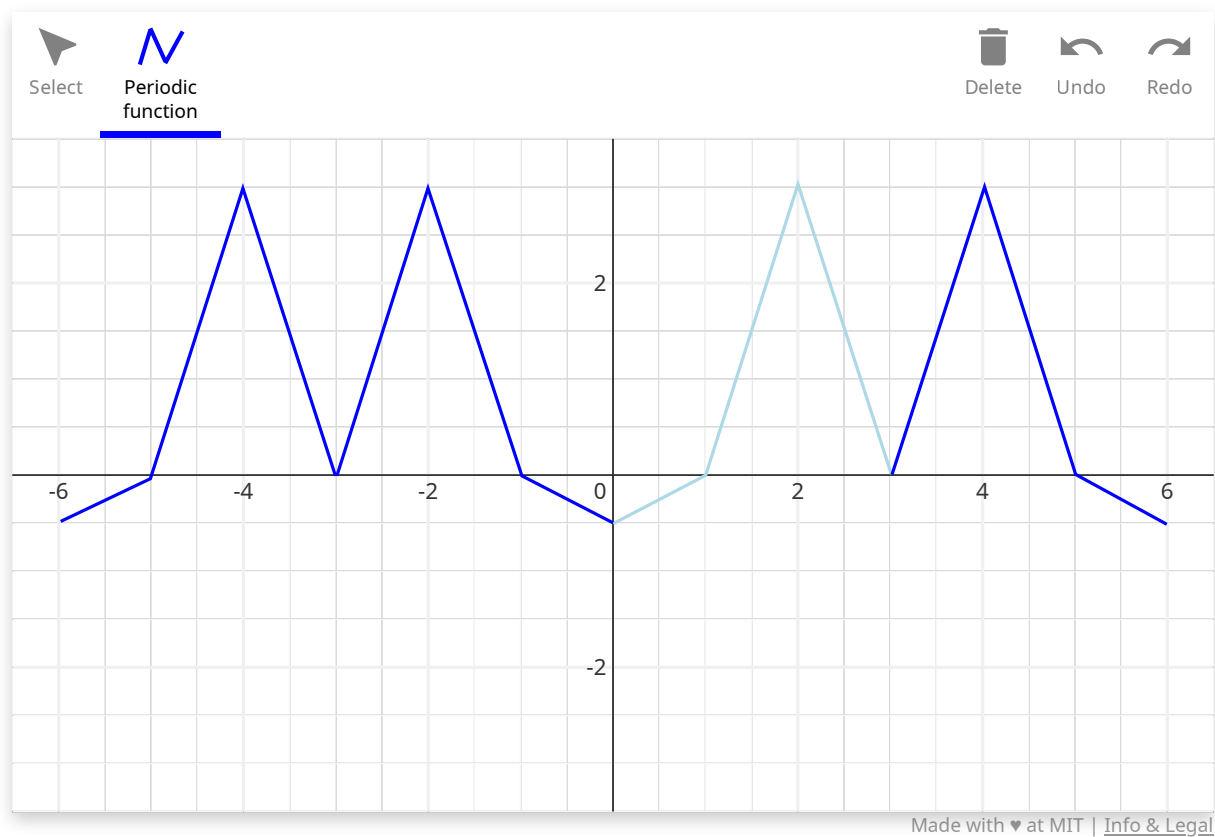
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Below you see the graph of the function $g(x)$ defined on the interval $[0, 3]$, which is piecewise defined

$$g(x) = \begin{cases} x/2 - 1/2 & 0 < x < 1 \\ 3x - 3 & 1 < x < 2 \\ -3x + 9 & 2 < x < 3 \end{cases}$$

Sketch the even periodic extension of this function over the interval $[-6, 6]$. Be sure to sketch over the outline.



Answer .

