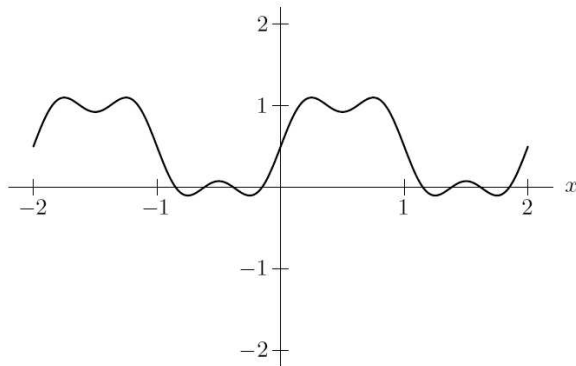


MathQuest: Series

Fourier Series

- Find the Fourier series on the interval $[-\pi, \pi]$ for the function $y = 2x + 3$.
 - $2 \sin x - \sin 2x + \frac{2}{3} \sin 3x - \frac{1}{2} \sin 4x + \dots$
 - $3 + 2 \sin x - \sin 2x + \frac{2}{3} \sin 3x - \frac{1}{2} \sin 4x + \dots$
 - $3 + 2 \sin x - \cos x + \frac{2}{3} \sin 2x - \frac{1}{2} \cos 4x + \dots$
 - $3 + 2 \cos x - \cos 2x + \frac{2}{3} \cos 3x - \frac{1}{2} \cos 4x + \dots$
 - It is not possible to create this Fourier series.
- The Fourier Series for $f = x^3$ on the interval $[-\pi, \pi]$ contains
 - only sines.
 - only cosines.
 - both sines and cosines.
 - This is impossible.
- The Fourier Series for $f = 3e^x$ on the interval $[-\pi, \pi]$ contains
 - only sines.
 - only cosines.
 - both sines and cosines.
 - This is impossible.
- The figure below contains the graph of the first three terms of the Fourier series of which of the following functions?
 - $f(x) = \begin{cases} 0, & -1 < x < 0 \\ 1, & 0 < x < 1 \end{cases}$ and $f(x+2) = f(x)$
 - $f(x) = \begin{cases} -1, & -1 < x < 0 \\ 1, & 0 < x < 1 \end{cases}$ and $f(x+2) = f(x)$
 - $f(x) = |x|$ on $-1 < x < 1$ and $f(x+2) = f(x)$

(d) $f(x) = \begin{cases} 1+x, & -1 < x < 0 \\ 1, & 0 < x < 1 \end{cases}$ and $f(x+2) = f(x)$



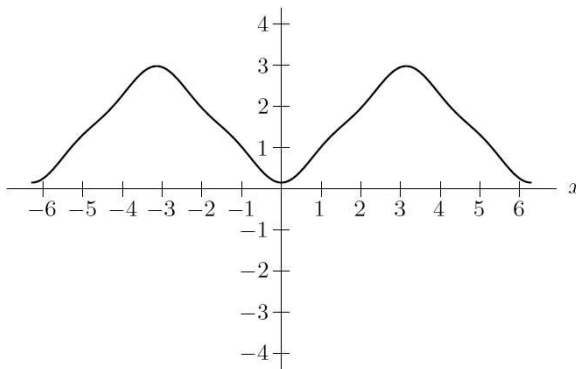
5. The figure below contains the graph of the first three terms of the Fourier series of which of the following functions?

(a) $f(x) = 3(x/\pi)^3$ on $-\pi < x < \pi$ and $f(x+2\pi) = f(x)$

(b) $f(x) = |x|$ on $-\pi < x < \pi$ and $f(x+2\pi) = f(x)$

(c) $f(x) = \begin{cases} -3, & -\pi < x < 0 \\ 3, & 0 < x < \pi \end{cases}$ and $f(x+2\pi) = f(x)$

(d) $f(x) = \begin{cases} \pi+x, & -\pi < x < 0 \\ \pi-x, & 0 < x < \pi \end{cases}$ and $f(x+2\pi) = f(x)$



6. The figure below contains the graph of the first three non-zero terms of the Fourier series of which of the following functions?

(a) $f(x) = 3(x/\pi)^3$ on $-\pi < x < \pi$ and $f(x+2\pi) = f(x)$

(b) $f(x) = |x|$ on $-\pi < x < \pi$ and $f(x+2\pi) = f(x)$

(c) $f(x) = \begin{cases} -3, & -\pi < x < 0 \\ 3, & 0 < x < \pi \end{cases}$ and $f(x+2\pi) = f(x)$

$$(d) f(x) = \begin{cases} \pi + x, & -\pi < x < 0 \\ \pi - x, & 0 < x < \pi \end{cases} \text{ and } f(x + 2\pi) = f(x)$$

