

Discovery Exercise for Fourier Series With Different Periods and Finite Domains

1. Consider the function $f(x) = \sin(x) + \sin(3x) + \sin(10x)$.
 - (a) Find $f(\pi/6)$, $f(13\pi/6)$, and $f(25\pi/6)$.

 - (b) Find another x -value for which $f(x) = f(\pi/6)$.

 - (c) What is the period of this function?

2. The function $g(x) = \cos(px)$ has the property that $g(x) = g(x + 5)$ for all x values.
 - (a) The function $g(x)$ might have a period of 5. What value of p would lead to this period?

 - (b) The function $g(x)$ might also have a period of $5/2$. What value of p would lead to this period?

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 - (c) What are all the possible periods of $g(x)$, and their corresponding p -values?

 - (d) If you sum all the functions in Part (c), what is the period of the resulting function?