Definitions

- The fourier sine series of f(x) on $(0, l)$ is given by

$$f(x) = \sum_{n=1}^{\infty} A_n sin(\frac{n\pi x}{l})$$

where $A_n = \frac{2}{l} \int_0^l f(x)sin(\frac{n\pi x}{l})dx$ for all $n = 1, 2, ...$

- The fourier cosine series of f(x) on $(0, l)$ is given by

$$f(x) = \sum_{n=0}^{\infty} B_n cos(\frac{n\pi x}{l})$$

where $B_n = \frac{2}{l} \int_0^l f(x)cos(\frac{n\pi x}{l})dx$ for all $n = 1, 2, ...$ and $B_0 = \frac{1}{l} \int_0^l f(x)cos(\frac{n\pi x}{l})dx$

Questions

1. Find the fourier sine series of $f(x) = 1$ on $(0, \pi)$

2. Plug in $x = \frac{\pi}{2}$. What series do you get?

3. Find the fourier sine series of $f(x) = x$ on $(0, l)$

4. Plug in $x = \frac{l}{2}$. What series do you get?

5. Find the fourier cosine series of $f(x) = x^2$ on $(0, l)$ directly by definition

6. Find the fourier cosine series of $f(x) = x^2$ on $(0, l)$ by integrating the fourier sine series of $f(x) = x$ on $(0, l)$