

Math 240 - Assignment 11

April 25, 2024

Name _____

Score _____

Show all work to receive full credit. Supply explanations when necessary. This assignment is due May 2.

1. Let $f(x) = \begin{cases} 0, & -\pi \leq x \leq 0 \\ \pi - x, & 0 < x \leq \pi \end{cases}$ Determine the Fourier series for f .
2. Let $f(x) = x$ on $(-\pi, \pi)$. Find the Fourier series for f .
3. Without actually computing the Fourier coefficients, what is the Fourier series for $f(x) = 1 + \sin 5x - \cos 8x$ on $(-\pi, \pi)$? Explain.
4. Let $f(x) = x^2$ on $(-2, 2)$. Find the Fourier series for f .
5. Let $f(x) = x^2$ on $(0, 2)$. Find the Fourier cosine series for f .
6. Let $f(x)$ be the periodic extension (with period 2) of its portion defined on $[0, 2)$ as shown below.

$$f(x) = \begin{cases} 0, & 0 \leq x < 1 \\ 1, & 1 \leq x < 2 \end{cases}$$

- (a) Roughly sketch the graph of 3 or 4 periods of f .
- (b) Determine the Fourier series for f .