

Theoretical Physics
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Chapter O Homework. Fourier Series

HW-O1. Orthogonality of the Cosine Functions. Show that

$$\int_{-\pi}^{+\pi} \cos(nx) \cos(mx) dx = \pi \delta_{nm}$$

You must do your integrals using the backward Euler formula as we did in the class notes for the sine case. Then use your above result to show that

$$a_n = \frac{1}{\pi} \int_{-\pi}^{+\pi} f(x) \cos(nx) dx .$$

HW-O2. The Ramp or Sawtooth Waveform. Find the Fourier amplitudes for the ramp wave which has an amplitude of 1.

