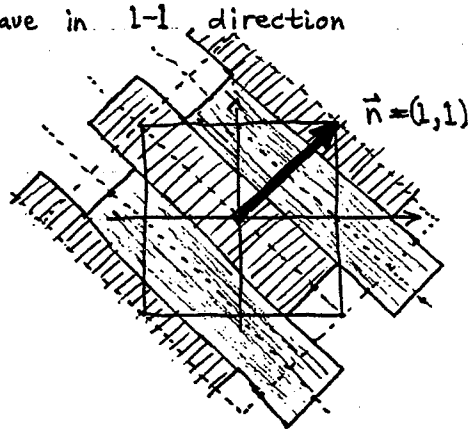


# Fourier Series - N-dimensional series - Examples - Square Wave in 1-1 direction

$f(\vec{x}) =$   
 ex: 1 Square wave in 1-1 direction



In this case we can use a 1-dimensional solution and rotate it to the 1-1 direction.

From earlier tools the 1-dim sol'n was

$$a_n \text{ odd} = \frac{4\sqrt{2}}{2\pi n} (-1)^{\frac{n+1}{2}} \quad a_n \text{ even}, b_n = 0.$$

The amplitudes remain the same when we rotate to the 1-1 direction, but we only get  $\vec{n}$ 's of form  $(n, n, \dots, n)$  with  $n$  odd. We also only get  $\cos$  terms.

$$f(\vec{x}) = \sum_{\substack{\vec{n}=(n,\dots,n) \\ n \text{ odd}}} a_n \sqrt{2} \cos(2\pi \vec{n} \cdot \vec{x})$$

$$\text{where } a_n = \frac{4\sqrt{2}}{2\pi n} (-1)^{\frac{n+1}{2}}$$