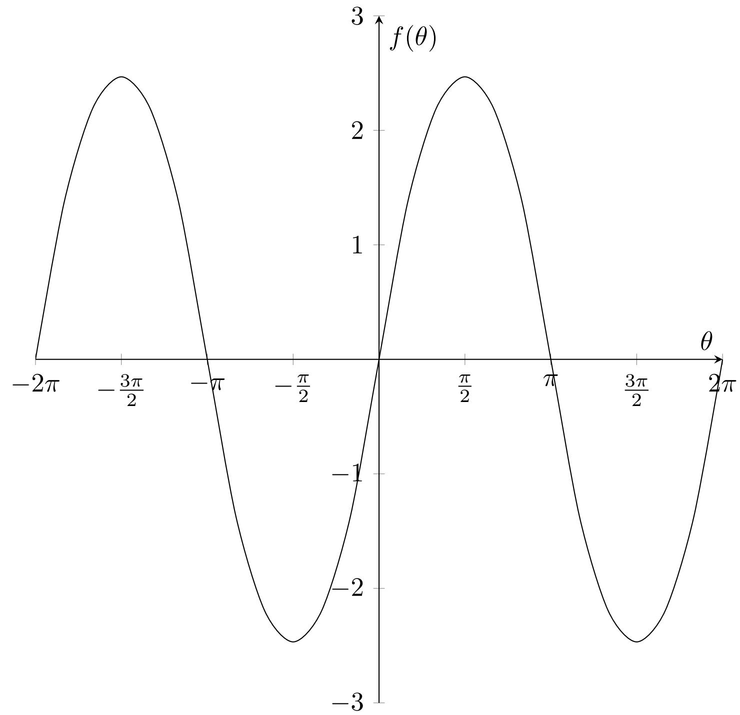
(a)



(b) Since f is odd, its Fourier series is sine with coefficients

$$\begin{aligned} A_k &= \frac{2}{\pi}\int_0^\pi f(\theta)\sin k\theta d\theta \\ &= \frac{2}{\pi}\int_0^\pi \theta(\pi-\theta)\sin k\theta d\theta \\ &= \frac{2-\pi k\sin\pi k - 2\cos\pi k}{k^3} \\ &= \frac{2-2(-1)^k}{k^3} \end{aligned}$$

For k even, $A_k = 0$. For k odd, $A_k = 4/k^3$. Thus,

$$f(x) \sim \frac{2}{\pi}\sum_{k=1}^{\infty} A_k \sin k\theta = \frac{8}{\pi}\sum_{k\ \text{odd}\geq 1}\frac{\sin k\theta}{k^3}.$$

Since $\sum \left|k^{-3}\right|$ converges absolutely, we have equality by corollary 2.3:

$$f(x) = \frac{8}{\pi}\sum_{k\ \text{odd}\geq 1}\frac{\sin k\theta}{k^3}.$$

$\square$