

Quiz 3

Each correct answer = 25 points, each incorrect answer is -6 points.

1. Let $f(x) = x$ if $-1 < x \leq 1$, $f(x) = f(x+2)$. The Fourier series of f is

1. $\frac{2}{\pi} \left[\frac{\cos \pi}{1} - \frac{\cos 2\pi}{2} + \frac{\cos 3\pi}{3} - \dots \right]$,

2. $\frac{2}{\pi} \left[\frac{\sin \pi}{1} - \frac{\sin 2\pi}{2} + \frac{\sin 3\pi}{3} - \dots \right]$

3. $2\pi - \cos 2\pi + \cos 3\pi - \dots$

4. $\pi - \sin \pi + \cos 2\pi - \sin 3\pi \dots$

5. $\frac{\sin \pi}{1} - \frac{\cos 2\pi}{2} + \frac{\sin 3\pi}{3} - \dots$

2. Let f be an odd function, periodic of period 2π . Let $f(x) = a_0 + \sum_{n=0}^{\infty} [a_n \cos nx + b_n \sin nx]$ be its Fourier series. Then only one of the following options is possible (circle it)

1. $a_0 \neq 0, a_n \neq 0, b_n \neq 0$

2. $a_0 = 0, a_n \neq 0, b_n \neq 0$

3. $a_0 = 0, a_n = 0, b_n \neq 0$

4. $a_0 \neq 0, a_n \neq 0, b_n = 0$

5. $a_0 = 0, a_n \neq 0, b_n = 0$

3. Let $f(x)$ be an odd function; $g(x)$ an even function; $h(x) = f(x)g(x)$; and $p(x) = f(x)g(x)$. Then

1. $h(x)$ is an even function

2. $h(x)$ is neither even nor an odd function

3. $h(x)$ is an odd function

4. $p(x)$ is both even and odd

5. $p(x)$ is even on $(-\infty, 0]$ and odd on $[0, \infty)$

4. Let $f(x)$ be a periodic function of period 3. Let $g(x) = f(3x/2)$ is

1. Periodic of period 2

2. Periodic of period $3/2$

3. Periodic of period $2/3$

4. Periodic of period 6

5. Is not periodic