

question

2 views

Daily Challenge 19.5

(Due: Saturday November 24 at 12:00 noon Eastern)

(1) Problem: periodic functions and periodic derivatives.

A function f is *periodic* with *period* a if $f(x + a) = f(x)$ for all x .

(a) If f is periodic with period a and f is integrable on $[0, a]$, show that

$$\int_0^a f = \int_b^{b+a} f$$

for all b .

(b) Find a function f which is *not* periodic, but whose derivative f' is periodic. [Hint: Choose a periodic function g for which it is guaranteed that $f(x) = \int_0^x g$ is not periodic.]

(c) Suppose f' is periodic with period a and $f(a) = f(0)$. Prove that f is also periodic with period a .

(d) Conversely, if f' is periodic with period a and f is periodic (with some period not necessarily equal to a), prove that $f(a) = f(0)$.

daily_challenge

Updated 4 months ago by Christian Ferko

the students' answer, where students collectively construct a single answer

(a) Suppose some function $F'(x) = f(x)$; we then see by applying the FTC to each side that $F(a) - F(0) = F(b + a) - F(b)$ (WIP)

Updated 4 months ago by Logan Pachulski

the instructors' answer, where instructors collectively construct a single answer

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