

수열 $\{a_n\}$ 이

$$a_1 = -1, a_n = 2 - \frac{1}{2^{n-2}} \quad (n \geq 2)$$

등비수열

이다. 구간 $[-1, 2)$ 에서 정의된 함수 $f(x)$ 가 모든 자연수 n 에 대하여

$$f(x) = \sin(2^n \pi x) \quad (a_n \leq x \leq a_{n+1})$$

이다. $-1 < \alpha < 0$ 인 실수 α 에 대하여 $\int_{\alpha}^t f(x)dx = 0$ 을 만족시키는

$t (0 < t < 2)$ 의 값의 개수가 103일 때, $\log_2(1 - \cos(2\pi\alpha))$ 의 값은? [4점]

① - 48

② - 50

③ - 52

④ - 54

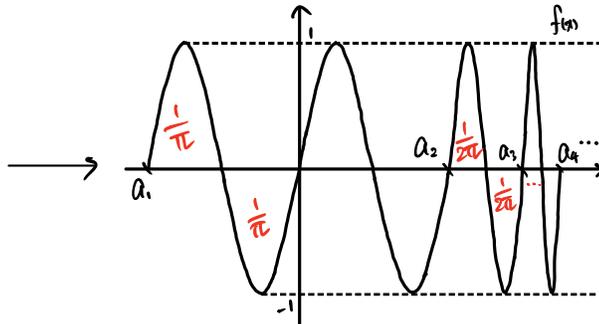
⑤ - 56

$$a_2 = 2 - 1 = 1$$

$$a_3 = 2 - \frac{1}{2} = \frac{3}{2}$$

$$a_4 = 2 - \frac{1}{4} = \frac{7}{4}$$

⋮



$$\text{if) } d = -\frac{1}{2}$$

$$\therefore t = \frac{1}{2} \rightarrow 1\text{개}$$

$$\text{if) } d = -\frac{1}{4}$$

$$\therefore t = \frac{1}{4}, \frac{3}{4}, \frac{5}{4}$$

⋮

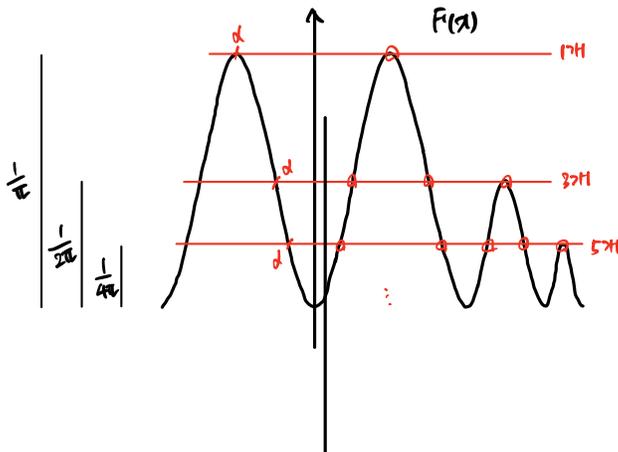
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⋮



$$\rightarrow 1\text{개} : \frac{\pi}{2} : \frac{1}{\pi} = \frac{1}{2^0 \pi}$$

$$\rightarrow 3\text{개} : \frac{\pi}{2} : \frac{1}{2\pi} = \frac{1}{2^1 \pi}$$

⋮

$$\rightarrow 103\text{개} : \frac{\pi}{2} : \frac{1}{2^{51} \pi}$$

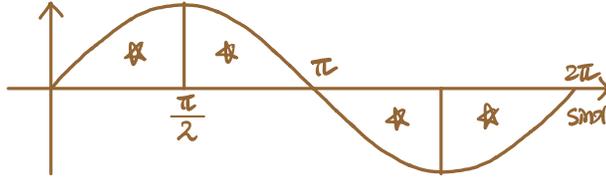
$$\int_d^0 \sin(2\pi x) dx = -\frac{1}{2^{51} \pi}$$

$$\left[-\frac{1}{2\pi} \cos(2\pi x) \right]_d^0 = -\frac{1}{2\pi} \{1 - \cos(2\pi d)\} = -\frac{1}{2^{51} \pi}$$

$$\therefore 1 - \cos(2\pi d) = \frac{1}{2^{50}}$$

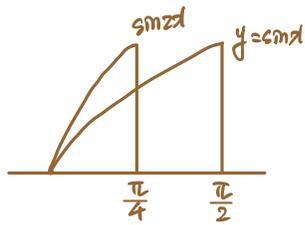
$$\therefore \log_2(1 - \cos(2\pi d)) = -50$$

* 참고 : 삼각함수 한 조각의 넓이는 1이다.



$$\int_0^{\frac{\pi}{2}} \sin x \, dx = [-\cos x]_0^{\frac{\pi}{2}} = 1$$

* = 1



- 한 칸
- $y = \sin 2x \rightarrow$ 가로: $\frac{1}{2}$ 배 $\rightarrow 1 \times \frac{1}{2}$
 - $y = 2\sin x \rightarrow$ 세로: 2 배 $\rightarrow 1 \times 2$
 - $y = a \sin bx \rightarrow 1 \times \frac{1}{b} \times a$