

1.  $f(x) = \frac{1}{1+2^x} + \frac{1}{1+3^x} + \frac{1}{1+4^x}$

olduğuna göre,

$$\int_1^5 f(x) dx + \int_{-5}^{-1} f(x) dx$$

İntegralinin değeri kaçtır?

- A) 12    B) 6    C) 10    D) 8    E) 16

$$\int_{-5}^{-1} \left( \frac{1}{1+2^x} + \frac{1}{1+3^x} + \frac{1}{1+4^x} \right) dx = \int_5^1 \left( \frac{1}{1+2^{-u}} + \frac{1}{1+3^{-u}} + \frac{1}{1+4^{-u}} \right) (-du)$$

$x = -u$   
 $dx = -du$

$$= \int_1^5 \left( \frac{1}{1+2^{-u}} + \frac{1}{1+3^{-u}} + \frac{1}{1+4^{-u}} \right) du$$

$$= \int_1^5 \underbrace{\left( \frac{1}{1+2^{-x}} + \frac{1}{1+3^{-x}} + \frac{1}{1+4^{-x}} \right)}_{\int_1^5 f(-x)}$$

$$= \int_1^5 f(x) dx + \int_1^5 f(-x) dx = \int_1^5 (f(x) + f(-x)) dx$$

$$= \int_1^5 \left( \frac{1}{1+2^x} + \frac{1}{1+3^x} + \frac{1}{1+4^x} + \frac{1}{1+2^{-x}} + \frac{1}{1+3^{-x}} + \frac{1}{1+4^{-x}} \right) dx = \int_1^5 3 \cdot dx$$

$$= 3x \Big|_1^5 = 15 - 3 = 12$$