Topic: Sum of the sequence of partial sums

Question: Use the partial sums equation to find the sum of the series.

$$s_n = 4 + \frac{8}{n}$$

Answer choices:

A 2

B 0

C 8

D 4

Solution: D

Given a series a_n, we can find its partial sum s_n using the formula

$$\sum_{n=1}^{\infty} a_n = \lim_{n\to\infty} s_n$$

But when we're given the sequence of partial sums s_n, we can use the same formula to go backwards and get the sum of the series a_n.

Plugging in the partial sum sequence s_n, we get

$$\sum_{n=1}^{\infty} a_n = \lim_{n\to\infty} 4 + \frac{8}{n}$$

$$\sum_{n=1}^{\infty} a_n = 4 + \frac{8}{\infty}$$

$$\sum_{n=1}^{\infty} a_n = 4 + 0$$

$$\sum_{n=1}^{\infty} a_n = 4$$

The sum of the series a_n is 4.

Topic: Sum of the sequence of partial sums

Question: Use the partial sums equation to find the sum of the series.

$$s_n = \frac{6n^2 + 4n}{n^2 - 9}$$

Answer choices:

A $\frac{5}{2}$

B $\frac{4}{9}$

C 6

D 0

Solution: C

Given a series a_n, we can find its partial sum s_n using the formula

$$\sum_{n=1}^{\infty} a_n = \lim_{n \to \infty} s_n$$

But when we're given the sequence of partial sums s_n, we can use the same formula to go backwards and get the sum of the series a_n.

Plugging in the partial sum sequence s_n, we get

$$\sum_{n=1}^{\infty} a_n = \lim_{n \to \infty} \frac{6n^2 + 4n}{n^2 - 9}$$

$$\sum_{n=1}^{\infty} a_n = \frac{\infty}{\infty}$$

Since we get an indeterminate form, we'll go back a step and manipulate our function.

$$\sum_{n=1}^{\infty} a_n = \lim_{n \to \infty} \frac{6n^2 + 4n}{n^2 - 9} \left(\frac{\frac{1}{n^2}}{\frac{1}{n^2}} \right)$$

$$\sum_{n=1}^{\infty} a_n = \lim_{n \to \infty} \frac{\frac{6n^2}{n^2} + \frac{4n}{n^2}}{\frac{n^2}{n^2} - \frac{9}{n^2}}$$

$$\sum_{n=1}^{\infty} a_n = \lim_{n \to \infty} \frac{6 + \frac{4}{n}}{1 - \frac{9}{n^2}}$$

$$\sum_{n=1}^{\infty} a_n = \frac{6 + \frac{4}{\infty}}{1 - \frac{9}{\infty}}$$

$$\sum_{n=1}^{\infty} a_n = \frac{6 + 0}{1 - 0}$$

$$\sum_{n=1}^{\infty} a_n = 6$$

The sum of the series a_n is 6.

Topic: Sum of the sequence of partial sums

Question: Use the partial sums equation to find the sum of the series.

$$s_n = 5 + \frac{4}{e^n}$$

Answer choices:

A 5

B 4

C e

D $\frac{1}{e}$

Solution: A

Given a series a_n, we can find its partial sum s_n using the formula

$$\sum_{n=1}^{\infty} a_n = \lim_{n\to\infty} s_n$$

But when we're given the sequence of partial sums s_n, we can use the same formula to go backwards and get the sum of the series a_n.

Plugging in the partial sum sequence s_n, we get

$$\sum_{n=1}^{\infty} a_n = \lim_{n\to\infty} 5 + \frac{4}{e^n}$$

$$\sum_{n=1}^{\infty} a_n = 5 + \frac{4}{\infty}$$

$$\sum_{n=1}^{\infty} a_n = 5 + 0$$

$$\sum_{n=1}^{\infty} a_n = 5$$

The sum of the series a_n is 5.