

A36: Sigma Notation Worksheet

19.3 Sigma Notation

Sigma Notation - A way to write a series/partial sum. It is used a lot in calculus.

④ - upper limit (the last # you'll plug in)

$$\sum_{n=1}^4 (2n+5)$$

general term/formula (where you'll plug in #s) (AKA a_n)

① = ① - lower limit (the 1st # you'll plug in)

index (where you'll plug #s in to the general term/formula)

$$= (2(1)+5) + (2(2)+5) + (2(3)+5) + (2(4)+5)$$

$$= 7 + 9 + 11 + 13$$

$$= 40$$

Ex #1 Expand the series and find the sum.

$$a) \sum_{n=1}^5 (3n+1) = (3(1)+1) + (3(2)+1) + (3(3)+1) + (3(4)+1) + (3(5)+1)$$

$$= 4 + 7 + 10 + 13 + 16$$

$$\boxed{\sum_{n=1}^5 (3n+1) = 50}$$

$$b) \sum_{n=1}^8 (5-2n) = 3 + 1 - 1 - 3 - 5 - 7 - 9 - 11$$

$$\boxed{\sum_{n=1}^8 (5-2n) = -32}$$

$$c) \sum_{n=1}^{10} (2n) = 2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20$$

$$\boxed{\sum_{n=1}^{10} (2n) = 110}$$

$$d) \sum_{n=0}^{10} (3n+1) = 1 + 4 + 7 + 10 + 13 + 16 + 19 + 22 + 25 + 28 + 31$$

$$\boxed{\sum_{n=0}^{10} (3n+1) = 176}$$

$$e) \sum_{n=100}^{108} (2n) = 200 + 202 + 204 + 206 + 208 + 210 + 212 + 214 + 216$$

$$\boxed{\sum_{n=100}^{108} (2n) = 1872}$$

Ex #2 Express the following in sigma notation.

a) Sum of the first 10 terms of $80+75+70+65+\dots$

$$\sum_{n=1}^{10} (85-5n)$$

$$a_1 = 80 \quad d = -5$$

$$a_n = a_1 + (n-1)d$$

$$a_n = 80 + (n-1)(-5) \leftarrow$$

$$a_n = 80 - 5n + 5$$

$$a_n = 85 - 5n \leftarrow$$

b) $3+7+11+15+19+23+27$

$$\sum_{n=1}^7 (4n-1)$$

$$a_1 = 3 \quad d = 4$$

$$a_n = a_1 + (n-1)d$$

$$a_n = 3 + (n-1)4$$

$$= 3 + 4n - 4$$

$$a_n = 4n - 1$$

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