Notes Sigma Formulas

Ex. 1 $\sum_{j=1}^{4} 3 = 3+3+3+3 = 12$

Ex. 2 $\sum_{i=1}^{5} 6 = 6+6+6+6+6 = 30$

Do you see a shortcut???

A shortcut for ex. 1 and ex. 2

$$\boxed{\sum_{k=1}^{n} c = nc}$$

Notes Sigma Formulas

Ex. 3 $\sum_{j=1}^{4} j = 1+2+3+4 = 10$

Ex. 4 $\sum_{k=1}^{3} 3k = 3(1)+3(2)+3(3)$

$= 3+6+9 = 18$

$= 3(1+2+3)$

$3(6) = 18$

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

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

$= 4(1+4+9) = 56$

$4(14)$

Ex. 6 $\sum_{n=1}^{3} (n+n^2) = (1+1^2)+(2+2^2)$

$+ (3+3^2)$

$= (1+2+3) + 1^2+2^2+3^2 = 6+14$

$= \boxed{20}$

Summation Properties

1. $\sum_{k=1}^{n} ca_k = c\sum_{k=1}^{n} a_k$

2. $\sum_{k=1}^{n} (a_k + b_k) = \sum_{k=1}^{n} a_k + \sum_{k=1}^{n} b_k$

Notes Sigma Formulas

Summation Formulas

Constant Series	Linear Series	Quadratic Series
$\sum_{k=1}^{n} c = nc$	$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$	$\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

Ex. 1 $\sum_{m=1}^{5}(2m^2 + 3m + 2)$

constant in front & split into parts

$= 2\sum_{m=1}^{5} m^2 + 3\sum_{m=1}^{5} m + \sum_{m=1}^{5} 2$

$n=5$ $\quad n=5$ $\quad (5)(2)$

$2\left[\frac{n(n+1)(2n+1)}{6}\right] + 3\left[\frac{n(n+1)}{2}\right] + nc$

$2\left[\frac{5(5+1)(2(5)+1)}{6}\right] + 3\left[\frac{5(5+1)}{2}\right] + 5(2)$

$2\left[\frac{5(\cancel{6})(11)}{\cancel{6}}\right] + 3\left[\frac{5(\cancel{6})3}{\cancel{2}}\right] + 10$

$110 + 45 + 10 = \boxed{165}$

Ex. 2 $\sum_{j=1}^{50}(-j^2 + 2j + 5)$

$\boxed{n=50}$

$= -\sum_{j=1}^{50} j^2 + 2\sum_{j=1}^{50} j + \sum_{j=1}^{50} 5$

$= -\left[\frac{n(n+1)(2n+1)}{6}\right] + 2\left[\frac{n(n+1)}{2}\right] + \overset{50(5)}{nc}$

$= -\left[\frac{50(50+1)(2(50)+1)}{6}\right] + \frac{\cancel{2}(50)(50+1)}{\cancel{2}} + 50(5)$

$-\left[\frac{50(51)(101)}{6}\right] + 50(51) + 250$

$-(42925) + 2550 + 250$

$= \boxed{-40{,}125}$