

PRE-CALCULUS: by Finney, Demana, Watts and Kennedy
Sums of Powers of Integers

Find the sum

A) $\sum_{n=1}^4 2 + \frac{5}{2}n - \frac{3}{2}n^2 =$

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

C) $\sum_{n=1}^6 n^3 =$

$$n = \frac{n(n+1)}{2}$$

$$n^2 = \frac{n(n+1)(2n+1)}{6}$$

Find the sum

$$\text{A) } \sum_{n=1}^{15} 2 + \frac{5}{2}n - \frac{3}{2}n^2 =$$

$$\begin{aligned} & \sum_{n=1}^{15} 2 + \sum_{n=1}^{15} \frac{5}{2}n - \sum_{n=1}^{15} \frac{3}{2}n^2 \\ & 2(15) + \frac{5}{2}\left(\frac{15(15+1)}{2}\right) - \frac{3}{2}\left(\frac{15(15+1)(2(15)+1)}{6}\right) \\ & 30 + 300 - 1860 \\ & \quad -1530 \end{aligned}$$

$$\text{B) } \sum_{n=1}^{20} n^2 + 5 =$$

$$\frac{20(20+1)(40+1)}{6} + 5(20)$$

$$\frac{20(21)(41)}{6} + 100$$

$$\begin{array}{r} 2870 + 100 \\ 2970 \end{array}$$

$$\text{C) } \sum_{n=1}^{20} n^3 = \frac{n^2(n+1)^2}{4}$$

$$\frac{20^2(20+1)^2}{4} = \frac{20^2(21)^2}{4}$$

$$= 44,100$$

20, 23, 25

26, 27

List the formulas for the following sums of powers of integers.

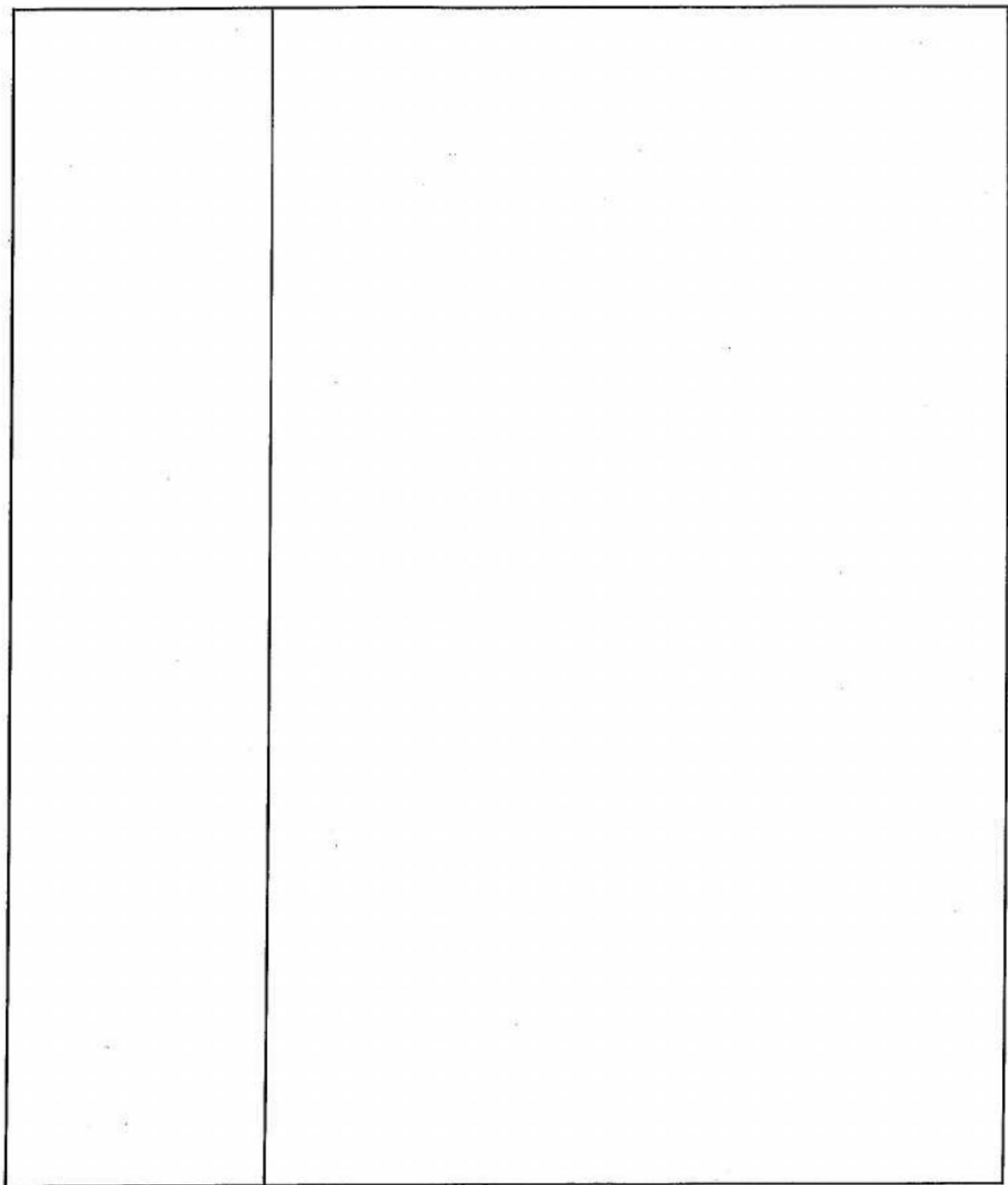
1. $1 + 2 + 3 + 4 + \dots + n = \underline{n(n+1)/2}$

2. $1^2 + 2^2 + 3^2 + 4^2 + \dots + n^2 = \underline{n(n+1)(2n+1)/6}$

3. $1^3 + 2^3 + 3^3 + 4^3 + \dots + n^3 = \underline{n^2(n+1)^2/4}$

4. $1^4 + 2^4 + 3^4 + 4^4 + \dots + n^4 = \underline{n(n+1)(2n+1)(3n^2+3n-1)/30}$

5. $1^5 + 2^5 + 3^5 + 4^5 + \dots + n^5 = \underline{n^2(n+1)^2(2n^2+2n-1)/12}$



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Limits of a Sequence

Find the limit of the sequence

A) $a_n = \frac{3n+1}{2n}$

B) $a_n = \frac{6n^2 + 2n - 3}{3n^2 + 1}$

C) $a_n = \frac{5n^3 + 2n - 3}{2n^3 + 1}$

D) $a_n = \frac{8n^4 + 2n - 3}{15n^4 + 1}$

Find the limit of the a sequence

A) $a_n = \frac{3n+1}{2n^2}$

B) $a_n = \frac{6n^2 + 2n - 3}{3n^5 + 1}$

C) $a_n = \frac{10n + 2n - 3}{3n^3 + 1}$

D) $a_n = \frac{5n^2 + 2n - 3}{10n^4 + 1}$

Find the limit of the a sequence

A) $a_n = \frac{3n^3 + 1}{2n^2}$

B) $a_n = \frac{6n^4 + 2n - 3}{3n^2 + 1}$

C) $a_n = \frac{6n^5 + 1}{3n^2}$

D) $a_n = \frac{6n^4 - 5n^3 + 1}{3n^3 + 2n + 1}$

1-12

Find the limit of the sequence

A) $a_n = \left(\frac{1}{n} - \frac{4}{1} \right) \left(\frac{3}{n} - \frac{1}{1} \right)$

$$(-4)(-1) = 4$$

Find the limit
not multiple choice!

$$\begin{aligned} & \left(\frac{1}{n} - \frac{4n}{n} \right) \left(\frac{3}{n} - \frac{n}{n} \right) \\ & \left(\frac{-4(n+1)}{n} \right) \left(\frac{-n+3}{n} \right) \\ & (-4) (-1) \end{aligned}$$

4

B) $a_n = \left(\frac{3n^3 + 4n + 2}{n^2 + 1} \right) \left(\frac{5n^2 - 32}{2n^4 + 7} \right) \quad \frac{15n^5}{2n^4}$

$$(\infty)(0) = 0$$

0