

## Geometrisk summa

ex. 5, 10, 20, 40, 80 (k=2)

$a_1, a_2, a_3, a_4, a_5$

$a_1, a_1 \cdot k, a_1 \cdot k^2, a_1 \cdot k^3, a_1 \cdot k^4$

Summan,  $S_5 = a_1 + a_1 \cdot k + a_1 \cdot k^2 + a_1 \cdot k^3 + a_1 \cdot k^4$

(multiplicera)  
med k  $S_5 \cdot k = a_1 \cdot k + a_1 \cdot k^2 + a_1 \cdot k^3 + a_1 \cdot k^4 + a_1 \cdot k^5$

(subtrahera)  $S_5 - S_5 \cdot k = a_1 - a_1 \cdot k^5$

$$S_5(1-k) = a_1(1-k^5)$$

$$S_5 = a_1 \cdot \frac{1-k^5}{1-k}$$

Ersätt 5 med n  $\Rightarrow$

$$S_n = a_1 \cdot \frac{1-k^n}{1-k}$$

## Alt. härledning

$$S_n = \sum_{k=1}^n ak^{k-1}$$

$$S_n = a + ak^1 + ak^2 + \dots + ak^{n-1}$$

$$kS_n = \underbrace{ak^1 + ak^2 + ak^3 + \dots + ak^{n-1} + ak^n}_{S_n - a} \Rightarrow$$

$$kS_n = S_n - a + ak^n$$

$$S_n - kS_n = a - ak^n$$

$$S_n(1-k) = a(1-k^n)$$

$$S_n = \frac{a(1-k^n)}{1-k}$$