## All the formulas listed below should be memorized. (Some of them may be found in Appendix A.) Also, you are required to know how to use them in calculations.

$(1) \sum_{k=0}^{n} (ca_k + db_k) = c \sum_{k=0}^{n} a_k + d \sum_{k=0}^{n} b_k$	(4) Summarizing n terms of geometrical
k=m $k=m$ $k=m$ $k=m$	progression with the first term b and
	common ratio r:
	$b+br+br^2++br^{n-1}=b\frac{r^n-1}{r-1}$
(2) $\sum_{k=m}^{n} c = c \sum_{k=m}^{n} 1 = c(n-m+1)$	(4a) Summarizing terms of infinite
$(2) \sum_{k=m}^{\infty} e^{-k} \sum_{k=m}^{\infty} 1 \cdot e^{-k} (n \cdot m \cdot 1)$	geometrical progression ( $ r  < 1$ ):
	$b+br+br^2+=\frac{b}{1-r}$ (5) Telescoping:
(3) Summarizing <i>n</i> terms of arithmetical progression	(5) Telescoping:
with the first term $a_1$ and common difference $d$ : $a_1 + a_2 + + a_n =$	$\sum_{k=m}^{n} (a_k - a_{k-1}) =$
$\begin{vmatrix} a_1 + a_2 + \dots + a_n - \\ = a_1 + (a_1 + d) + (a_1 + 2d) + \dots + (a_1 + (n-1)d) = \end{vmatrix}$	$= (a_m - a_{m-1}) + (a_{m+1} - a_m) + \dots + (a_n - a_{n-1})$
	=
$=\frac{a_1+a_n}{2}n$	$=a_n-a_{m-1}$
(3a) $\sum_{k=0}^{n} k = m + (m+1) + (m+2) + \dots + n =$	(5a) Telescoping:
$\lim_{k=m} \sum_{k=m}^{\infty} (m+1) + (m+2) + \dots + m = 1$	$\sum_{k=0}^{n} (a_k - a_{k+1}) =$
$=\frac{m+n}{2}(n-m+1)$	k=m
2	$\begin{vmatrix} = \\ (a_m - a_{m+1}) + (a_{m+1} - a_{m+2}) + \dots + (a_n - a_{n+1}) \end{vmatrix}$
	$= \frac{(\omega_m - \omega_{m+1}) \cdot (\omega_{m+1} - \omega_{m+2}) \cdot \dots \cdot (\omega_n - \omega_{n+1})}{(\omega_n - \omega_{m+1})}$
	$=a_m-a_{n+1}$
(3b) $\sum_{k=1}^{n} k = \frac{1+n}{2}n$	$= a_m - a_{n+1}$ (6) Harmonic numbers:
$(30)$ $\sum_{k=1}^{\infty} \kappa = 2$	$H_n = \sum_{k=1}^n \frac{1}{k} = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}$
	$\approx \ln n + \gamma + \frac{1}{12}$ ,
	where $\gamma \approx 0.57721$ (Euler's constant)
Logarithms  Logarithms	
$\log_a x^y = y \log_a x$ $\log_a \frac{x}{y} = \log_a x - \log_a y$	$\log_a(xy) = \log_a x + \log_a y$
$\log x - \frac{\log_b x}{\log x}$	$x^{\log_a y} = y^{\log_a x}$
$\log_a x = \frac{\log_b x}{\log_b a}$ $\log_a x = \frac{1}{\log_x a}$	