

Definitions and Formulas: This page contains some definitions used in this exam and a list of formulas (theorems) that you may use in the exam (without having to provide a proof). Note that you might not need all of these formulas on this exam.

Definitions

1.  $N = \{0, 1, 2, 3, \dots\}$ , the set of non-negative integers.
2.  $Z^+ = \{1, 2, 3, \dots\}$ , the set of positive integers.
3.  $Z$  is the set of *all* integers.
4.  $R$  is the set of *real numbers*.
5.  $R^+$  is the set of positive *real numbers*.

Formulas:

1.  $\binom{n}{i} = \frac{n!}{i!(n-i)!}$
2. If  $0 < i < n$  then  $\binom{n}{i} = \binom{n-1}{i-1} + \binom{n-1}{i}$
3.  $\neg(p \wedge q)$  is equivalent to  $\neg p \vee \neg q$
4.  $\neg(p \vee q)$  is equivalent to  $\neg p \wedge \neg q$
5.  $p \Rightarrow q$  is equivalent to  $\neg p \vee q$
6.  $\neg \forall x \in U (p(x))$  is equivalent to  $\exists x \in U (\neg p(x))$
7.  $\sum_{i=1}^{n-1} i = n(n-1)/2$
8.  $\sum_{i=1}^{n-1} i^2 = \frac{2n^3 - 3n^2 + n}{6}$
9. If  $r \neq 1$  then  $\sum_{i=0}^{n-1} r^i = \frac{1-r^n}{1-r}$
10. If  $r \neq 1$  then  $\sum_{i=0}^n i r^i = \frac{nr^{n+2} - (n+1)r^{n+1} + r}{(1-r)^2}$