Syntax MCS	Semantics MCS
Proof System MCS	Completeness MCS
Soundness MCS	Tautology MCS
Contradiction MCS	De Morgan's Laws MCS
Law of disjunction over Conjunction MCS	Law of conjunction over Disjunction MCS
CNF MCS	DNF MCS
$X \subseteq Y$ MCS	$X \subsetneq Y$ MCS
$X \subset Y$ MCS	Power set MCS
Cartesian Product MCS	Disjoint MCS
Domain/Source MCS	Codomain/Target MCS

The association of meaning and truth to the formulae of logic	The definition of well-formed formulae of the logic
All the "true" semantics formulae should be provable	The manipulation of formulae according to a system of rules
Where φ evaluates to true for every f	Formulae that are "provable" should be "true"
$\neg(X \wedge Y) \equiv \neg X \vee \neg Y$ $\neg(X \vee Y) \equiv \neg X \wedge \neg Y$	Where φ evaluates to true for every f
$p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$	$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$
The disjunction of a conjunction of literals	The conjunction of a disjunction of literals
X is not a subset of Y	X is a subset of Y
The set of all subsets of S	X is a proper subset of Y
Two sets that have a union of the empty set	$\{(x, y) : x \in X \text{ and } y \in Y\}$
The set B in the function $A \rightarrow B$	The set A in the function $A \rightarrow B$

Image MCS	Partial function MCS
Injective MCS	Surjective MCS
Bijective MCS	Reflexive MCS
Irreflexive MCS	Symmetry MCS
Antisymmetry MCS	Transitivity MCS
Reflexive closure MCS	Symmetric closure MCS
Transitive closure MCS	Equivalence Relation MCS
Partial Order MCS	Totally ordered set MCS
Well ordered set MCS	Predicate Symbol MCS
Signature MCS	Sentence MCS

A function such that $f(a) \in B$ or $f(a)$ is undefined	The result of passing a value through function
Every element in A maps to an element in B, all elements in B have been mapped to by at least 1 element in A	One to one function
$(a, a) \in R, \forall a \in A$ (For all values in A there is a relation to itself)	Both injective and surjective (1 to 1 connections and all elements in both sets have a mapping)
Whenever $(a, b) \in R$, then $(b, a) \in R \forall a, b \in A$ (For all possible pairs of values there is both (a,b) and (b,a))	$(a, a) \notin R \forall a \in A$ (Not every value in A has a relation to itself)
When $(a, b)(b, c) \in R$ then $(a, c) \in R, \forall a, b, c \in A$ (If there is a relation from element A to B and B to C then there is from A to C)	Whenever $(a, b)(b, a) \in R$, then $a = b \forall a, b \in A$ (If there is a pair where there is a relation both ways then the value is the same)
The smallest symmetric relation that contains R. It is obtained by adding to R all the pairs (x,y) for which (y, x) but not (x, y) lies in R	The smallest reflexive relation that contains R. It is obtained by adding to R all the pairs (x, x) that do not already lie in R
A relation that is Reflexive, symmetric and transitive Denoted by $a \equiv b$ or $a \sim b$	The smallest transitive relation that contains R. It is the relation defined as $\{(a,b) : a, b \in A, (a,b) \in R^n, \text{ for some } n \geq 1\} = \bigcup_{n=1}^{\infty} R^n$
$(S, \leq)$ is a poset and two elements in S are comparable	A relation that is reflexive, anti-symmetric and transitive A partial order R on set S is called a **poset**
A symbol with an associated arity	$(S, \leq)$ is a poset and $\leq$ is a total ordering and every non-empty subset of S has a least element
A formula with no free variables	The finite set of predicate (relation) and constant symbols

Product Rule MCS	Product rule MCS
Permutation MCS	r-Permutation MCS
r-Combination MCS	How to use stars and bars MCS
Experiment MCS	Sample Space MCS
Event MCS	Bernoulli trial MCS
Bayes' Theorem MCS	Random Variable MCS
Expected Value MCS	Variance MCS
Chebyshev's Inequality MCS	Markov's inequality MCS
Directed Graph (digraph) MCS	Multigraphs MCS
Pseudographs MCS	Vertex or edge weighted graphs MCS

If a procedure can be done in one of n_1 ways or one of n_2 ways, there are $n_1 + n_2$ ways to do the task	With a two (n_1 and n_2) steps in a procedure there are $n_1 \times n_2$ ways to do the procedure
An ordered arrangement of r elements in a set of at least r (n) distinct objects $P(n,r) = \frac{n!}{(n-r)!}$	A set of distinct objects in an ordered arrangement of these objects
$C(Stars + Bars, Bars)$	An unordered selection of r elements from a set of at least r (n) objects $C(n,r) = \frac{n!}{r!(n-r)!}$
The set of possible outcomes	A procedure that yields one of a given set of possible outcomes
An experiment with two possible outcomes, success and failure	A subset of the sample space
A function from the sample space of an experiment to the real numbers	$p(F\|E) = \frac{p(E\|F)p(F)}{p(E\|F)p(F) + p(E\|\overline{F})p(\overline{F})}$
$V(X) = \sum_{i=1}^{n} \left(X\left(s_i\right) - E(X)\right)^2 \cdot p\left(s_i\right)$	$E(X) = \sum_{i=1}^{n} p\left(s_i\right) X\left(s_i\right)$
$p(X(s) \geq a) \leq E(X)/a$	$p(\|X(s) - E(X)\| \geq r) \leq V(X)/r^2$
Multiple edges allowed between two vertices	Edges can have directions
Vertices and/or edges can have weights	Edges of the form uu (loops) are allowed

Endpoints MCS	Neighbours MCS
Incident MCS	Adjacent MCS
Neighbourhood MCS	Degree MCS
Isolated vertex MCS	End/Pendant Vertex MCS
Proper Subgraph MCS	Spanning subgraph MCS
Handshaking Lemma MCS	P_n MCS
C_n MCS	$K_{p,q}$ MCS
K_n MCS	Walk MCS
Path MCS	Circuit/Closed Walk MCS
Cycle MCS	Length MCS

Vertices connected by an edge	The vertices at the end of an edge
Two edges which both go to the same vertex	The nodes connected by an edge
The number of neighbours	The set of neighbours of a vertex
A vertex with degree 1	A vertex with degree 0
All vertices in the graph are in the subgraph	The subgraph does not contain all the vertices and edges of the graph
A path on n vertices	$\sum_{v\in V} \deg(v) = 2\|E\|$
A complete bipartite graph	A cycle on n vertices
A sequence of edges	A complete bipartite graph which contains all the possible edges between pairs of vertices
A walk where the start vertex is the same as the last vertex	A walk where all vertices are distinct
The number of edges in a path or cycle	A closed walk where all vertices are distinct apart from the first and last

Distance MCS	Diameter MCS
Weakly connected MCS	Strongly connected MCS
Strongly connected component MCS	Eulerian circuit MCS
Forest MCS	Tree MCS
Rooted Trees MCS	$a \mid b$ MCS
The prime number theorem MCS	Relatively prime numbers MCS
Fermat's Little theorem MCS	Euler's ϕ function MCS
Dot product MCS	Spanning a vector space MCS
Basis of a vector space MCS	Dimension of a vector space MCS
Row space MCS	Column space MCS

The largest distance between two vertices in a graph	The length of the shortest path between two vertices if a path exists, ∞ otherwise
Any two distinct vertices and connected by directed paths in both directions	The graph obtained from the digraph G forgetting direction of connection
Each of the vertices in a connected graph have an even degree	A maximal strongly connected subgraph of G
A connected forest	An acyclic (without cycles) graph
a is a factor of b	A tree in which one vertex is fixed as the root and every edge is directed away from this root
$gcd(a, b) = 1$	The number of primes not exceeding x approaches $x/ln(x)$
$\phi(n)$ is the number of integers $\leqslant n$ that are relatively prime with n	If p is prime and a is not a multiple of p then $a^{p-1} \equiv 1 \mod p$ and $a^p \equiv a \mod p$
The smallest subspace of V that contains all linear combinations	$u \cdot v = u_1v_1 + u_2v_2 + \ldots + u_nv_n$
The dimension of a vector space is n where Any subset of V with more than n vectors is linearly dependent Any subset of V with fewer than n vectors does not span V	S is linearly independent S spans V
The subspace of $\mathbb{R}^m$ spanned by the column vectors of A	The subspace of $\mathbb{R}^n$ spanned by the row vectors of A

Null space MCS	Rank MCS
Nullity MCS	Linear map MCS
Kernel MCS	Range MCS
Similar Matrices MCS	Diagonalisable MCS

The dimension of the row space (the number of leading variables in the general solution to $ax = 0$) or dimension of range	The solution set of the linear system $Ax = 0$
A linear transformation between vector spaces	The dimension of the null space (the number of free variables in the general solution to $ax = 0$) or dimension of kernel
$\{u \in W \| u = f(x) \text{ for some } x \in V\}$	$\{x \in V \| f(x) = 0\}$
Similar to a diagonal matrix	$A = P^{-1}BP$