Appendix: Mathematics for Business Analytics

Lower case letters in *italics* are variables (numbers)
Letters in **BOLD** capitals are vectors (lists of numbers) or matrices (tables of numbers)

Brackets

$$a(b+c) = ab + ac$$

$$(a+b)(c+d) = ac + ad + bc + bd$$

$$(a+b)^2 = (a+b)(a+b) = a^2 + 2ab + b^2$$

Symbols

$a=b$	a is equal to b	$\forall a$	for all a
$a \neq b$	a is not equal to b	$\sqrt{a}$	square root of a
$a \approx b$	a is approximately equal to b	$\sqrt[3]{a}$	cubed root of a
$a \leq b$	a is less than or equal to b	$\sqrt[n]{a}$	n^{th} root of a
$a \geq b$	a is greater than or equal to b	$a \to b$	a approaches b
$a \gg b$	a is much greater than b	$a \pm b$	a plus or minus b
$a \ll b$	a is much smaller than b		

Set theory symbols

Let A and B be sets. Sets contain zero or more elements.

$A \in B$	A is a member of the set B
$A \notin B$	A is not a member of the set B
$A \subset B$	A is a proper subset of B. A is a subset of B, but A is not equal to B (i.e. there exists at least one element of B not contained in A).
$A \subseteq B$	A is a subset of B. Every element of A is also an element of B. This means that any set is a subset of itself, but not a proper subset.
$A \not\subset B$	A is not a subset of B
$A = \varnothing$	A is an empty set, a set with no elements
$A \cap B$	The intersection of A and B all the elements that are in both A and B
$A \cup B$	The union of A and B. All the elements of A and B combined, but with no elements repeated
$\overline{A}$	The compliment of A. All the elements not in A
$A - B$	All the elements in A but not in B

$n(A)$	The number of elements in A
$A = B$	A is equal to B. A and B both contain the same elements
$A \cong B$	A is equivalent to B. A and B both contain the same number of elements

Examples.

Let the universal set $U = \{0,1,2,3,4,5,6,7,8,9\}$, set $A = \{0,2,4,6,8\}$ and set $B = \{0,1,2,3,4\}$. The following Venn diagram illustrates this scenario and all of the following statements are true.

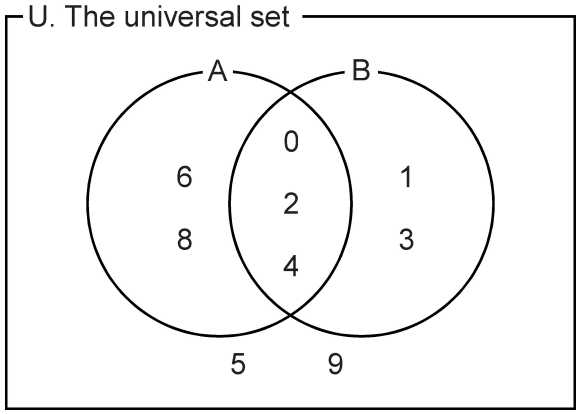

Figure 0.1. Venn diagram to illustrate set theory notation

$0 \in A$	0 is a member of A.
$1 \in B$	1 is a member of B.
$1 \notin A$	1 is not a member of A.
$A \subset U$	A is a subset of U.
$A \not\subset B$	A is not a subset of B.
$A \cong B$	A is equivalent to B, both have the same number of elements.
$n(A) = 5$	A has 5 elements.
$A \neq B$	A is not equal to B, some of the elements are different.
$A - B = \{6,8\}$	All the elements in A, but not in B.
$A \cap B = \{0,2,4\}$	The intersection of A and B; all the elements that are in both A and B.
$A \cup B = \{0,1,2,3,4,6,8\}$	The union of A and B; a list of all the element in A and B, but with nothing repeated.

Special meanings

LHS	Left Hand Side (the LHS of an equation)
RHS	Right Hand Side (the RHS of an equation)

Special numbers

π pi, $\pi \approx 3.141592$. $\underbrace{\text{How}}_{3.}$. $\underbrace{\text{I}}_{1}$ $\underbrace{\text{wish}}_{4}$ $\underbrace{\text{I}}_{1}$ $\underbrace{\text{could}}_{5}$ $\underbrace{\text{calculate}}_{9}$ $\underbrace{\text{pi}}_{2}$