Phase 11 b : Function Application

Basic function application (single argument):

$f(x)$
$square(5)$
$parent(john)$

Multiple arguments:

$g(x, y, z)$
$sum(a, b, c, d)$
$max(x, y)$

Nested function application:

$f(g(x))$
$f(g(h(x)))$
$outer(middle(inner(value)))$

Empty argument list:

$f()$
$initialize()$

Function application in expressions:

$f(x) \land g(y)$
$f(x) \Rightarrow g(x)$
$f(x) > 0$
$height(m) < 10$

Function application in quantifiers:

$\forall\, x : \mathbb{N} \bullet f(x) > 0$
$\exists\, d : Dog \bullet gentle(d) \land neat(d)$
$\forall\, x, y : \mathbb{N} \bullet g(x, y) = g(y, x)$

Special Z notation functions (generic instantiation):

$$| \; items : \text{seq } \mathbb{N} possibilities : \; Itemcollection : \text{bag } Xsequence : \text{iseq } \mathbb{N}$$

Function application with set membership:

$x \in f(S)$
$y \in \; X$
$z \in \text{seq } \mathbb{N}$

Complex predicates from Solution 5:

$\exists\, d : Dog \bullet gentle(d) \land neat(d)$
$\forall\, d : Dog \bullet neat(d) \Rightarrow attractive(d)$

Function application in definitions:

$$f : X \ \ Y$$

$$\forall x : X \bullet f(x) \in Y$$

PersonHeight

$$height : Person \ \mathbb{N}$$

$$\forall p : Person \bullet height(p) > 0 \land height(p) < 300$$

Function application with comparisons:

$f(x, y) > g(x, y)$
$max(x, y) = max(y, x)$
$f(0) = 1$

Expression arguments:

$f(x \land y)$
$g(x \lor y, p \Rightarrow q)$
$h(a > b, c < d)$

Function application with subscripts and superscripts:

$f(x_i)$
$g(x^2)$
$h(a_1, a_2)$