Examples of program specification

1. Requirement for division program:

$[i_1 > i_2 > 0]\{P\}[(i_1 = i_2 o_1 + o_2) \wedge (o_1 \geq 0) \wedge (o_2 < i_2)]$

2. Requirement for gcd program:

$[(i_1 > 0) \wedge (i_2 > 0)]\{P\}[(\exists z_1, z_2 : (i_1 = o\, z_1) \wedge (i_2 = o\, z_2)) \wedge \neg(\exists h\ \exists z_1, z_2 : (i_1 = h\, z_1) \wedge (i_2 = h\, z_2) \wedge (h > 0))]$

3. Requirement for output being reverse of input:

$[n \geq 0]\{P\}[\forall\, 1 \leq j \leq n : o_j = i_{n-j+1}]$

- Instead of assertions for whole prog. one can have for prog.-fragments

4. Requirement for search of element within first n entries of table

$[n > 0]$

```
{Procedure search (table: in integer_array; n: in integer; element: in integer;
                   found: out Boolean);}
```

$[found \Leftrightarrow \exists\, 1 \leq i \leq n : table(i) = element]$

5. Requirement for a sorting procedure:

$[n > 0]$

```
{procedure sort (a: in out integer_array; n: in integer);}
```

$[\forall\, 1 \leq i < n : a(i) \leq a(i+1)]$

6. Requirement for object class to satisfy property INV through out it's life (construction, and applicable operations):

$[TRUE]\{\text{prog-fragment for construction}\}[INV]$

$[INV \wedge pre_i]\{\text{prog.-frag. for operation-}i\}[INV \wedge post_i]$