Listing 1: question1

```
1  ---------- MODULE question1a ----------
2  EXTENDS Integers , Sequences , TLC, FiniteSets
3  CONSTANTS N
4  ASSUME N % 4 = 0
5  (*
6  --algorithm algo {
7  variable
8          canal = <<>>;
9          witness = -1;
10         result = -1;
11
12 \* Macro for sending primitive: sending a message m on the fifo channel chan
13 macro Send(m, chan) {
14     chan := Append(chan , m);
15   };
16
17 \* Macro for receivinbg  primitive: receiving  a message m on the fifo channel chan
18 macro Recv(v, chan) {
19     await chan # <<>>;
20     v := Head(chan);
21     chan := Tail(chan);
22   };
23
24 process (one = 1)
25 variable
26         x = 0;
27 {
28        w: while (x <= N) {
29      a:x := x + 1;
30      b: if ( x % 4 = 0) {
31            c: Send(x,canal);
32       };
33 };
34 d: Send(-1,canal);
35 };
36
37 process (two = 2)
38 variable s = 0,mes;
39 {
40          w: while (TRUE) {
41          a: if (canal # <<>>) {
42             b:Recv(mes,canal);
43                c: if (mes # -1) { d: s := s +mes;}
44                else {e: goto f;};
45          };
46          };
47          f: print <<s>>;
48          g: result := s;
49 };
50
51 process (three = 3)
52 variable
53         i = 0;
54         s = 0;
55         b = N \div 4;
56 {
57       w: while ( i< b) {
58    a: i := i + 1;
59       b: s := s +i;
60       };
61       c: witness := 4*s;
62 };
63 };
64 }
65 end algorithm;
66
67 *)
68 ====
```

Figure 1: Programme de l'exercice 1