## 2006 Paper 8 Question 15

**Specification and Verification I**

If $C$ is a command that contains one or more occurrences of a command `BREAK`, then
`LOOP (C)` is a command that repeatedly executes $C$ until a `BREAK` is executed.
Executing `BREAK` immediately terminates the execution of `LOOP (C)`.

How might ideas from Floyd–Hoare Logic be used to verify programs that use the
`LOOP/BREAK` construct, such as the following program that sets the variable `RES` to
the factorial of the initial value of the variable `X` (if `X > 0`)?

```
RES := 1;
LOOP (IF X=1 THEN BREAK ELSE RES := RES×X; X := X-1)
```

You may place restrictions that you consider reasonable on the form of $C$, but these
should be discussed and motivated.

[20 marks]