

CSCI 531 Spring 2007
QUIZ 1
Assigned Monday, 07-01-19

1. Show that the following program fragment, with precondition $i = 1 \wedge sum = 0 \wedge n \geq 1$, terminates:

```
while (i <> n) do
  begin
    sum := sum+i;
    i := i+1
  end
```

Answer: Consider the quantity $n - i$, where we indentify the names of variables with their values. This quantity starts nonnegative, because the precondition $i = 1 \wedge sum = 0 \wedge n \geq 1$ entails $n - i \geq 0$ at the beginning of the loop. This quantity always decreases as the body of the loop is executed, because i increases by one, while n remains the same. This quantity never becomes negative, because the loop body is excuted only if $n <> i$. So, as the program executes, $n - i$ decreases monotonically, and $n - i$ cannot become negative. Therefore, the program must stop excuting.

2. Do you know what a loop invariant is? (Please answer yes or no.)

Answer: There is no correct answer. About 30 out of 35 students answered no.