Discussion 8: Loop invariants
Task 1

Precondition: \( \emptyset \leq c \leq c.length \)

\[
\begin{array}{c}
c:\\
\end{array}
\]

Invariant: \( \emptyset \leq k \leq c.length \)

\[
\begin{array}{c|c}
c:\\
\end{array}
\]
Loop template

/* A: loop initialization */

// inv: loop invariant (e.g. c[0..k) == 0)

while ( /* B: loop guard */ ) {

    /* C: loop body */

}
Dutch National Flag

- Problem proposed by Edsger Dijkstra, a foundational computer scientist
  - His "shortest path algorithm" will feature prominently later in the course
Task 2

Precondition: 0 \[?\] f.length

Postcondition: 0 \[Red\ \White\ \Blue\] f.length
Loop template

/* A: loop initialization */

// inv: loop invariant
while ( /* B: loop guard */ ) {

/* C: loop body */

}