VC 6\_6

Ensures Clause of Copy\_Queue (Condition from "restores" parameter mode): Queue\_Test\_Facility.fa(28)  
  
Goal:

((Q' o temp\_Q') = Q')

Given:

1. (|temp\_Q'| = 0)
2. ((temp\_Q'' o Q'') = (Q' o temp\_Q'))
3. (I' = |temp\_Q'|)
4. (|Q''| = 0)
5. (Q = (temp\_Q'' o Q''))
6. (I'' = |Q''|)
7. (Q\_Copy' = temp\_Q'')
8. (temp\_Q = Empty\_String)
9. (|temp\_Q| <= 3)
10. (3 <= max\_int)
11. (min\_int <= 3)
12. (Max\_Length = 3)
13. (Q\_Copy = Empty\_String)
14. (|Q| <= Max\_Length)
15. (|Q| > 0)
16. (Last\_Char\_Num > 0)
17. (0 < max\_int)
18. (min\_int <= 0)

VC 3\_1

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(Empty\_String = Empty\_String)

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 3\_2

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(|Q| = |Q|)

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 3\_3

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(Q = (Empty\_String o Q))

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 3\_7

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

((temp\_Q' o <CS1'>) = (temp\_Q' o <CS1'>))

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 3\_8

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(|Q'| = |Q'|)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 3\_9

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

((temp\_Q' o Q'') = ((temp\_Q' o <CS1'>) o Q'))

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 4\_1

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(Empty\_String = Empty\_String)

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 4\_2

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(|Q| = |Q|)

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 4\_3

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(Q = (Empty\_String o Q))

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 5\_1

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(Empty\_String = Empty\_String)

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 5\_11

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

((temp\_Q' o <CS1'>) = (temp\_Q' o <CS1'>))

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_12

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(|Q'| = |Q'|)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_13

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

((temp\_Q' o Q'') = ((temp\_Q' o <CS1'>) o Q'))

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_2

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(|Q| = |Q|)

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 5\_3

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(Q = (Empty\_String o Q))

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 5\_7

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

((temp\_Q' o <CS1'>) = (temp\_Q' o <CS1'>))

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_8

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(|Q'| = |Q'|)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_9

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

((temp\_Q' o Q'') = ((temp\_Q' o <CS1'>) o Q'))

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 6\_1

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(Empty\_String = Empty\_String)

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 6\_2

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(|Q| = |Q|)

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 6\_3

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(40)  
  
Goal:

(Q = (Empty\_String o Q))

Given:

1. (temp\_Q = Empty\_String)
2. (|temp\_Q| <= 3)
3. (3 <= max\_int)
4. (min\_int <= 3)
5. (Max\_Length = 3)
6. (Q\_Copy = Empty\_String)
7. (|Q| <= Max\_Length)
8. (|Q| > 0)
9. (Last\_Char\_Num > 0)
10. (0 < max\_int)
11. (min\_int <= 0)

VC 3\_10

Termination of While Statement: Queue\_Test\_Facility.fa(41)  
  
Goal:

(|Q'| < |Q''|)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_10

Termination of While Statement: Queue\_Test\_Facility.fa(41)  
  
Goal:

(|Q'| < |Q''|)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_14

Termination of While Statement: Queue\_Test\_Facility.fa(41)  
  
Goal:

(|Q'| < |Q''|)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 3\_4

Requires Clause of Dequeue in Procedure Copy\_Queue: Queue\_Test\_Facility.fa(43)  
  
Goal:

(|Q''| /= 0)

Given:

1. (|Q''| /= 0)
2. (Q = (temp\_Q' o Q''))
3. (I' = |Q''|)
4. (Q\_Copy' = temp\_Q')
5. (temp\_Q = Empty\_String)
6. (|temp\_Q| <= 3)
7. (3 <= max\_int)
8. (min\_int <= 3)
9. (Max\_Length = 3)
10. (Q\_Copy = Empty\_String)
11. (|Q| <= Max\_Length)
12. (|Q| > 0)
13. (Last\_Char\_Num > 0)
14. (0 < max\_int)
15. (min\_int <= 0)

VC 5\_4

Requires Clause of Dequeue in Procedure Copy\_Queue: Queue\_Test\_Facility.fa(43)  
  
Goal:

(|Q''| /= 0)

Given:

1. (|Q''| /= 0)
2. (Q = (temp\_Q' o Q''))
3. (I' = |Q''|)
4. (Q\_Copy' = temp\_Q')
5. (temp\_Q = Empty\_String)
6. (|temp\_Q| <= 3)
7. (3 <= max\_int)
8. (min\_int <= 3)
9. (Max\_Length = 3)
10. (Q\_Copy = Empty\_String)
11. (|Q| <= Max\_Length)
12. (|Q| > 0)
13. (Last\_Char\_Num > 0)
14. (0 < max\_int)
15. (min\_int <= 0)

VC 3\_5

Requires Clause of Enqueue in Procedure Copy\_Queue: Queue\_Test\_Facility.fa(45)  
  
Goal:

(|temp\_Q'| < 3)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_5

Requires Clause of Enqueue in Procedure Copy\_Queue: Queue\_Test\_Facility.fa(45)  
  
Goal:

(|temp\_Q'| < 3)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 3\_6

Requires Clause of Enqueue in Procedure Copy\_Queue: Queue\_Test\_Facility.fa(46)  
  
Goal:

(|temp\_Q'| < 3)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 5\_6

Requires Clause of Enqueue in Procedure Copy\_Queue: Queue\_Test\_Facility.fa(46)  
  
Goal:

(|temp\_Q'| < 3)

Given:

1. (Q'' = (<CS1'> o Q'))
2. (|Q''| /= 0)
3. (Q = (temp\_Q' o Q''))
4. (I' = |Q''|)
5. (Q\_Copy' = temp\_Q')
6. (temp\_Q = Empty\_String)
7. (|temp\_Q| <= 3)
8. (3 <= max\_int)
9. (min\_int <= 3)
10. (Max\_Length = 3)
11. (Q\_Copy = Empty\_String)
12. (|Q| <= Max\_Length)
13. (|Q| > 0)
14. (Last\_Char\_Num > 0)
15. (0 < max\_int)
16. (min\_int <= 0)

VC 4\_4

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(52)  
  
Goal:

(|temp\_Q'''| = |temp\_Q'''|)

Given:

1. (|Q''| = 0)
2. (Q = (temp\_Q''' o Q''))
3. (I'' = |Q''|)
4. (Q\_Copy' = temp\_Q''')
5. (temp\_Q = Empty\_String)
6. (|temp\_Q| <= 3)
7. (3 <= max\_int)
8. (min\_int <= 3)
9. (Max\_Length = 3)
10. (Q\_Copy = Empty\_String)
11. (|Q| <= Max\_Length)
12. (|Q| > 0)
13. (Last\_Char\_Num > 0)
14. (0 < max\_int)
15. (min\_int <= 0)

VC 4\_5

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(52)  
  
Goal:

((temp\_Q''' o Q'') = (Q'' o temp\_Q'''))

Given:

1. (|Q''| = 0)
2. (Q = (temp\_Q''' o Q''))
3. (I'' = |Q''|)
4. (Q\_Copy' = temp\_Q''')
5. (temp\_Q = Empty\_String)
6. (|temp\_Q| <= 3)
7. (3 <= max\_int)
8. (min\_int <= 3)
9. (Max\_Length = 3)
10. (Q\_Copy = Empty\_String)
11. (|Q| <= Max\_Length)
12. (|Q| > 0)
13. (Last\_Char\_Num > 0)
14. (0 < max\_int)
15. (min\_int <= 0)

VC 4\_8

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(52)  
  
Goal:

(|temp\_Q'| = |temp\_Q'|)

Given:

1. (temp\_Q'' = (<CS1'> o temp\_Q'))
2. (|temp\_Q''| /= 0)
3. ((temp\_Q''' o Q'') = (Q' o temp\_Q''))
4. (I' = |temp\_Q''|)
5. (|Q''| = 0)
6. (Q = (temp\_Q''' o Q''))
7. (I'' = |Q''|)
8. (Q\_Copy' = temp\_Q''')
9. (temp\_Q = Empty\_String)
10. (|temp\_Q| <= 3)
11. (3 <= max\_int)
12. (min\_int <= 3)
13. (Max\_Length = 3)
14. (Q\_Copy = Empty\_String)
15. (|Q| <= Max\_Length)
16. (|Q| > 0)
17. (Last\_Char\_Num > 0)
18. (0 < max\_int)
19. (min\_int <= 0)

VC 4\_9

Inductive Case of Invariant of While Statement: Queue\_Test\_Facility.fa(52)  
  
Goal:

((Q' o temp\_Q'') = ((Q' o <CS1'>) o temp\_Q'))

Given:

1. (temp\_Q'' = (<CS1'> o temp\_Q'))
2. (|temp\_Q''| /= 0)
3. ((temp\_Q''' o Q'') = (Q' o temp\_Q''))
4. (I' = |temp\_Q''|)
5. (|Q''| = 0)
6. (Q = (temp\_Q''' o Q''))
7. (I'' = |Q''|)
8. (Q\_Copy' = temp\_Q''')
9. (temp\_Q = Empty\_String)
10. (|temp\_Q| <= 3)
11. (3 <= max\_int)
12. (min\_int <= 3)
13. (Max\_Length = 3)
14. (Q\_Copy = Empty\_String)
15. (|Q| <= Max\_Length)
16. (|Q| > 0)
17. (Last\_Char\_Num > 0)
18. (0 < max\_int)
19. (min\_int <= 0)

VC 6\_4

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(52)  
  
Goal:

(|temp\_Q''| = |temp\_Q''|)

Given:

1. (|Q''| = 0)
2. (Q = (temp\_Q'' o Q''))
3. (I'' = |Q''|)
4. (Q\_Copy' = temp\_Q'')
5. (temp\_Q = Empty\_String)
6. (|temp\_Q| <= 3)
7. (3 <= max\_int)
8. (min\_int <= 3)
9. (Max\_Length = 3)
10. (Q\_Copy = Empty\_String)
11. (|Q| <= Max\_Length)
12. (|Q| > 0)
13. (Last\_Char\_Num > 0)
14. (0 < max\_int)
15. (min\_int <= 0)

VC 6\_5

Base Case of the Invariant of While Statement: Queue\_Test\_Facility.fa(52)  
  
Goal:

((temp\_Q'' o Q'') = (Q'' o temp\_Q''))

Given:

1. (|Q''| = 0)
2. (Q = (temp\_Q'' o Q''))
3. (I'' = |Q''|)
4. (Q\_Copy' = temp\_Q'')
5. (temp\_Q = Empty\_String)
6. (|temp\_Q| <= 3)
7. (3 <= max\_int)
8. (min\_int <= 3)
9. (Max\_Length = 3)
10. (Q\_Copy = Empty\_String)
11. (|Q| <= Max\_Length)
12. (|Q| > 0)
13. (Last\_Char\_Num > 0)
14. (0 < max\_int)
15. (min\_int <= 0)

VC 4\_10

Termination of While Statement: Queue\_Test\_Facility.fa(53)  
  
Goal:

(|temp\_Q'| < |temp\_Q''|)

Given:

1. (temp\_Q'' = (<CS1'> o temp\_Q'))
2. (|temp\_Q''| /= 0)
3. ((temp\_Q''' o Q'') = (Q' o temp\_Q''))
4. (I' = |temp\_Q''|)
5. (|Q''| = 0)
6. (Q = (temp\_Q''' o Q''))
7. (I'' = |Q''|)
8. (Q\_Copy' = temp\_Q''')
9. (temp\_Q = Empty\_String)
10. (|temp\_Q| <= 3)
11. (3 <= max\_int)
12. (min\_int <= 3)
13. (Max\_Length = 3)
14. (Q\_Copy = Empty\_String)
15. (|Q| <= Max\_Length)
16. (|Q| > 0)
17. (Last\_Char\_Num > 0)
18. (0 < max\_int)
19. (min\_int <= 0)

VC 4\_6

Requires Clause of Dequeue in Procedure Copy\_Queue: Queue\_Test\_Facility.fa(55)  
  
Goal:

(|temp\_Q''| /= 0)

Given:

1. (|temp\_Q''| /= 0)
2. ((temp\_Q''' o Q'') = (Q' o temp\_Q''))
3. (I' = |temp\_Q''|)
4. (|Q''| = 0)
5. (Q = (temp\_Q''' o Q''))
6. (I'' = |Q''|)
7. (Q\_Copy' = temp\_Q''')
8. (temp\_Q = Empty\_String)
9. (|temp\_Q| <= 3)
10. (3 <= max\_int)
11. (min\_int <= 3)
12. (Max\_Length = 3)
13. (Q\_Copy = Empty\_String)
14. (|Q| <= Max\_Length)
15. (|Q| > 0)
16. (Last\_Char\_Num > 0)
17. (0 < max\_int)
18. (min\_int <= 0)

Requires Clause of Enqueue in Procedure Copy\_Queue: Queue\_Test\_Facility.fa(56)  
  
Goal:

(|Q'| < 3)

Given:

1. (temp\_Q'' = (<CS1'> o temp\_Q'))
2. (|temp\_Q''| /= 0)
3. ((temp\_Q''' o Q'') = (Q' o temp\_Q''))
4. (I' = |temp\_Q''|)
5. (|Q''| = 0)
6. (Q = (temp\_Q''' o Q''))
7. (I'' = |Q''|)
8. (Q\_Copy' = temp\_Q''')
9. (temp\_Q = Empty\_String)
10. (|temp\_Q| <= 3)
11. (3 <= max\_int)
12. (min\_int <= 3)
13. (Max\_Length = 3)
14. (Q\_Copy = Empty\_String)
15. (|Q| <= Max\_Length)
16. (|Q| > 0)
17. (Last\_Char\_Num > 0)
18. (0 < max\_int)
19. (min\_int <= 0)