TestCase 1:

Input

```
InsertBook(101, "Introduction to Algorithms", "Thomas H. Cormen", "Yes")
InsertBook(48, "Data Structures and Algorithms", "Sartaj Sahni", "Yes")
PrintBook(48)
InsertBook(132, "Operating System Concepts", "Abraham Silberschatz",
"Yes")
InsertBook(25, "Computer Networks", "Andrew S. Tanenbaum", "Yes")
BorrowBook(120, 48, 2)
BorrowBook(132, 101, 1)
InsertBook(73, "Introduction to the Theory of Computation", "Michael
Sipser", "Yes")
InsertBook(12, "Artificial Intelligence: A Modern Approach", "Stuart
Russell", "Yes")
InsertBook(6, "Database Management Systems", "Raghu Ramakrishnan",
"Yes")
BorrowBook(144, 48, 3)
BorrowBook(140, 48, 3)
BorrowBook(142, 48, 2)
BorrowBook(138, 12, 4)
BorrowBook(150, 12, 3)
BorrowBook(162, 12, 1)
ReturnBook(120, 48)
FindClosestBook(9)
DeleteBook(12)
ColorFlipCount()
InsertBook(125, "Computer Organization and Design", "David A.
Patterson", "Yes")
InsertBook(180, "Introduction to Software Engineering", "Ian
Sommerville", "Yes")
BorrowBook(111, 73, 3)
BorrowBook(52, 73, 1)
InsertBook(115, "Operating Systems: Internals and Design Principles",
"William Stallings", "Yes")
BorrowBook(153, 25, 2)
PrintBooks(10, 150)
InsertBook(210, "Machine Learning: A Probabilistic Perspective", "Kevin
P. Murphy", "Yes")
BorrowBook(171, 25, 3)
BorrowBook(2, 132, 2)
FindClosestBook(50)
BorrowBook(18, 101, 2)
InsertBook(80, "Software Engineering: A Practitioner's Approach", "Roger
S. Pressman", "Yes")
BorrowBook(210, 210, 1)
BorrowBook(43, 73, 1)
InsertBook(60, "Introduction to Computer Graphics", "David F. Rogers",
"Yes")
PrintBook(210)
InsertBook(4, "Design Patterns: Elements of Reusable Object-Oriented
Software", "Erich Gamma", "Yes")
InsertBook(2, "Introduction to the Theory of Computation", "Michael
Sipser", "Yes")
BorrowBook(34, 210, 2)
InsertBook(65, "Computer Networks: Principles, Protocols, and Practice",
"Olivier Bonaventure", "Yes")
```

```
ColorFlipCount()
DeleteBook(125)
DeleteBook(115)
DeleteBook(210)
ColorFlipCount()
DeleteBook(25)
DeleteBook(80)
ColorFlipCount()
Quit()
```

Output:

```
BookID = 48
Title = "Data Structures and Algorithms"
Author = "Sartaj Sahni"
Availability = "Yes"
BorrowedBy = None
Reservations = []

Book 48 borrowed by Patron 120

Book 101 borrowed by Patron 132

Book 48 Reserved by Patron 144

Book 48 Reserved by Patron 140

Book 48 Reserved by Patron 142

Book 12 borrowed by Patron 138

Book 12 borrowed by Patron 150

Book 12 borrowed by Patron 162

Book 48 Returned by Patron 120

Book 48 Allotted to Patron 142

BookID = 6
Title = "Database Management Systems"
Author = "Raghu Ramakrishnan"
Availability = "Yes"
BorrowedBy =  138
Reservations = []

BookID = 12
Title = "Artificial Intelligence: A Modern Approach"
Author = "Stuart Russell"
Availability = "No"
BorrowedBy = 138
Reservations = [162, 150]

Book 12 is no longer available. Reservations made by Patrons 162, 150 have been
cancelled!

Color Flip Count: 8

Book 73 borrowed by Patron 111

Book 73 Reserved by Patron 52
```

```
Book 25 borrowed by Patron 153

BookID = 25
Title = "Computer Networks"
Author = "Andrew S. Tanenbaum"
Availability = "No"
BorrowedBy = 153
Reservations = []

BookID = 48
Title = "Data Structures and Algorithms"
Author = "Sartaj Sahni"
Availability = "No"
BorrowedBy = 142
Reservations = [144, 140]

BookID = 73
Title = "Introduction to the Theory of Computation"
Author = "Michael Sipser"
Availability = "No"
BorrowedBy = 111
Reservations = [52]

BookID = 101
Title = "Introduction to Algorithms"
Author = "Thomas H. Cormen"
Availability = "No"
BorrowedBy = 132
Reservations = []

BookID = 115
Title = "Operating Systems: Internals and Design Principles"
Author = "William Stallings"
Availability = "yes"
BorrowedBy = None
Reservations = []

BookID = 125
Title = "Computer Organization and Design"
Author = "David A. Patterson"
Availability = "Yes"
BorrowedBy = None
Reservations = []

BookID = 132
Title = "Operating System Concepts"
Author = "Abraham Silberschatz"
Availability = "Yes"
BorrowedBy = None
Reservations = []

Book 25 Reserved by Patron 171

Book 132 Borrowed by Patron 2

BookID = 48
Title = "Data Structures and Algorithms"
Author = "Sartaj Sahni"
Availability = "No"
BorrowedBy = 142
Reservations = [144, 140]
```

```
Book 101 Reserved by Patron 18

Book 210 borrowed by Patron 210

Book 73 Reserved by Patron 43

BookID = 210
Title = "Machine Learning: A Probabilistic Perspective"
Author = "Kevin P. Murphy"
Availability = "No"
BorrowedBy = 210
Reservations = []

Book 210 Reserved by Patron 34

Color Flip Count: 19

Book 125 is no longer available

Book 115 is no longer available

Book 210 is no longer available. Reservation made by Patron 34 has been
cancelled!

Color Flip Count: 23

Book 25 is no longer available. Reservation made by Patron 171 has been
cancelled!

Book 80 is no longer available

Color Flip Count: 27

Program Terminated!!
```

Test Case 2:

Input

```
InsertBook(5, "The Secret Garden", "Jane Smith", "yes");
BorrowBook(101, 5, 2)
InsertBook(3, "The Great Gatsby", "Mark Johnson", "yes");
InsertBook(12, "To Kill a Mockingbird", "Sarah Lee", "yes");
BorrowBook(101, 5, 2)
BorrowBook(101, 3, 2)
DeleteBook(12)
PrintBooks(1,10)
DeleteBook(3)
DeleteBook(5)
PrintBook(5)
InsertBook(50, "The Catcher in the Rye", "Michael Brown", "yes")
InsertBook(22, "The Alchemist", "Paul Coelho", "yes")
BorrowBook(104, 22, 3)
BorrowBook(171, 22, 1)
BorrowBook(103, 22, 2)
InsertBook(10, "The Hobbit", "J.R.R. Tolkien", "yes")
InsertBook(72, "Brave New World", "Aldous Huxley", "yes")
InsertBook(94, "1984", "George Orwell", "yes")
ColorFlipCount()
```

```
BorrowBook(171, 94, 1)
ReturnBook(104, 22)
BorrowBook(132, 50, 3)
BorrowBook(103, 10, 2)
InsertBook(28, "Lord of the Flies", "William Golding", "yes")
BorrowBook(109, 72, 4)
BorrowBook(101, 50, 2)
DeleteBook(94)
BorrowBook(105, 22, 1)
PrintBooks(5, 100)
FindClosestBook(26)
ReturnBook(171, 22)
BorrowBook(171, 28, 1)
DeleteBook(50)
ColorFlipCount()
BorrowBook(107, 22, 2)
ReturnBook(103, 10)
BorrowBook(121, 10, 3)
DeleteBook(10)
DeleteBook(22)
ColorFlipCount()
Quit()
```

Output:

```
Book 5 Borrowed by patron 101

Book 5 Already Borrowed by patron 101

Book 3 Borrowed by patron 101

Book 12 is no longer available.

BookID = 3
Title = "The Great Gatsby"
Author = "Mark Johnson"
Availability = "No"
BorrowedBy = 101
Reservations = []


BookID = 5
Title = "The Secret Garden"
Author = "Jane Smith"
Availability = "No"
BorrowedBy = 101
Reservations = []

Book 3 is no longer available.

Book 5 is no longer available.

No book exists.

Book 22 Borrowed by patron 104.
```

```
Book 22 Reserved by patron 171.

Book 22 Reserved by patron 103.

Color Flip Count: 6

Book 94 borrowed by patron 171.

Book 22 returned by Patron 104.

Book 22 allotted to Patron 171

Book 50 borrowed by patron 132.

Book 10 borrowed by patron 103.

Book 72 borrowed by patron 109.

Book 50 reserved by patron 101.

Book 94 is no longer available.

Book 22 reserved by patron 105.

BookID = 10
Title = "The Hobbit"
Author = "J.R.R. Tolkien"
Availability = "No"
BorrowedBy = 103
Reservations = []

BookID = 22
Title = "The Alchemist"
Author = "Paul Coelho"
Availability = "No"
BorrowedBy = 171
Reservations = [105, 103]

BookID = 28
Title = "Lord of the Flies"
Author = "William Golding"
Availability = "Yes"
BorrowedBy = None
Reservations = []

BookID = 50
Title = "The Catcher in the Rye"
Author = "Michael Brown"
Availability = "No"
BorrowedBy = 132
Reservations = [101]

BookID = 72
Title = "Brave New World"
Author = "Aldous Huxley"
Availability = "No"
BorrowedBy = 109
```

```
Reservations = []

BookID = 28
Title = "Lord of the Flies"
Author = "William Golding"
Availability = "Yes"
BorrowedBy = None
Reservations = []

Book 22 Returned by Patron 171

Book 22 Allotted to Patron 105

Book 28 Borrowed by Patron 171

Book 50 is no longer available. Reservation made by Patron 101 has been
cancelled!

Color Flip Count: 13

Book 22 reserved by patron 107.

Book 10 returned by Patron 103.

Book 10 borrowed by patron 121.

Book 10 is no longer available.

Book 22 is no longer available. Reservations made by Patrons 103, 107
have been cancelled!

Color Flip Count: 15

Program Terminated!!
```

TESTCASE-3

Input

```
InsertBook(1, "Book1", "Author1", "Yes")
InsertBook(2, "Book2", "Author2", "Yes")
InsertBook(3, "Book3", "Author3", "Yes")
InsertBook(4, "Book4", "Author4", "Yes")
InsertBook(5, "Book5", "Author5", "Yes")
ReturnBook(101, 1)
BorrowBook(102, 2, 2)
BorrowBook(103, 3, 3)
InsertBook(6, "Book6", "Author6", "Yes")
InsertBook(7, "Book7", "Author7", "Yes")
InsertBook(8, "Book8", "Author8", "Yes")
BorrowBook(104, 4, 4)
```

```
BorrowBook(105, 5, 5)
ReturnBook(102, 2)
ReturnBook(103, 3)
ReturnBook(104, 4)
ReturnBook(105, 5)
BorrowBook(101, 6, 1)
BorrowBook(102, 7, 2)
BorrowBook(103, 8, 3)
InsertBook(9, "Book9", "Author9", "Yes")
InsertBook(10, "Book10", "Author10", "Yes")
```

Output:

```
Book 1 Returned by Patron 101

Book 2 Reserved by Patron 102

Book 3 Reserved by Patron 103

Book 4 Reserved by Patron 104

Book 5 Reserved by Patron 105

Book 2 Returned by Patron 102

Book 3 Returned by Patron 103

Book 4 Returned by Patron 104

Book 5 Returned by Patron 105

Book 6 Borrowed by Patron 101

Book 7 Reserved by Patron 102

Book 8 Reserved by Patron 103
```

Testcase-4

Input

```
InsertBook(1, "Book1", "Author1", "Yes")
InsertBook(2, "Book2", "Author2", "Yes")
InsertBook(3, "Book3", "Author3", "Yes")
InsertBook(4, "Book4", "Author4", "Yes")
InsertBook(5, "Book5", "Author5", "Yes")
InsertBook(6, "Book6", "Author6", "Yes")
InsertBook(7, "Book7", "Author7", "Yes")
InsertBook(8, "Book8", "Author8", "Yes")
InsertBook(9, "Book9", "Author9", "Yes")
InsertBook(10, "Book10", "Author10", "Yes")
BorrowBook(101, 1, 1)
BorrowBook(102, 2, 2)
BorrowBook(103, 3, 3)
```

```
BorrowBook(104, 4, 4)
BorrowBook(105, 5, 5)
ReturnBook(101, 1)
BorrowBook(106, 1, 1) // Book 1 is already reserved by Patron 106
BorrowBook(107, 2, 1) // Book 2 is currently borrowed by Patron 102
BorrowBook(108, 3, 1) // Book 3 is currently available
BorrowBook(109, 4, 1) // Book 4 is currently reserved by Patron 104
BorrowBook(110, 5, 1) // Book 5 is currently available
ReturnBook(102, 2) // Book 2 is now available
BorrowBook(107, 2, 1) // Book 2 is now available to Patron 107
DeleteBook(1) //
FindClosestBook(10) // Book 9 is the closest book to book 10.
InsertBook(11, "Book11", "Author11", "Yes")
ReturnBook(103, 3)
BorrowBook(112, 11, 1)
DeleteBook(11) // Book 11 is no longer available. Reservation made by
Patron 112 has been cancelled!
ColorFlipCount()
```

Output:

```
Book 1 Borrowed by Patron 101

Book 2 Borrowed by Patron 102

Book 3 Borrowed by Patron 103

Book 4 Borrowed by Patron 104

Book 5 Borrowed by Patron 105

Book 1 Returned by Patron 101

Book 1 Reserved by Patron 106

Book 2 Reserved by Patron 107
Book 3 Borrowed by Patron 108

Book 4 Reserved by Patron 109

Book 5 Borrowed by Patron 110

Book 2 Returned by Patron 102

Book 2 Borrowed by Patron 107

Book 1 is no longer available. Reservations made by Patrons 101 and 106
have been cancelled!

Book 9 is the closest book to book 10.

Book 11 Borrowed by Patron 112

Book 11 is no longer available. Reservation made by Patron 112 has been
cancelled!
```

```
ColorFlipCount: 2
```