# Case N = 1: Max = 1

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 1 | 1 | 0 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 2 | 1 | 1 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 3 | 1 | 2 |
| 2 | 1 | 1 | 0 |

# Case N = 2: Max = 3

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 2 | 2 | 0 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 3 | 2 | 1 |
| 2 | 1 | 1 | 0 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 4 | 2 | 2 |
| 2 | 2 | 1 | 1 |

## Bottles borrowed = 3

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 5 | 2 | 3 |
| 2 | 3 | 1 | 2 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 4

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 6 | 2 | 4 |
| 2 | 2 | 2 | 0 |

## Bottles borrowed = 5

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 7 | 2 | 5 |
| 2 | 3 | 2 | 1 |

# Case N = 3: Max = 4

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 3 | 3 | 0 |
| 2 | 1 | 1 | 0 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 4 | 3 | 1 |
| 2 | 2 | 1 | 1 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 5 | 3 | 2 |
| 2 | 3 | 1 | 2 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 3

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 6 | 3 | 3 |
| 2 | 2 | 2 | 0 |

## Bottles borrowed = 4

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 7 | 3 | 4 |
| 2 | 3 | 2 | 1 |

## Bottles borrowed = 5

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 8 | 3 | 5 |
| 2 | 4 | 2 | 2 |

# Case N = 4: Max = 6

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 4 | 4 | 0 |
| 2 | 2 | 1 | 1 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 5 | 4 | 1 |
| 2 | 3 | 1 | 2 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 6 | 4 | 2 |
| 2 | 2 | 2 | 0 |

## Bottles borrowed = 3

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 7 | 4 | 3 |
| 2 | 3 | 2 | 1 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 4

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 8 | 4 | 4 |
| 2 | 4 | 2 | 2 |
| 3 | 2 | 1 | 1 |

## Bottles borrowed = 5

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 9 | 4 | 5 |
| 2 | 3 | 3 | 0 |

## Bottles borrowed = 6

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 10 | 4 | 6 |
| 2 | 4 | 3 | 1 |

## Bottles borrowed = 7

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 11 | 4 | 7 |
| 2 | 5 | 3 | 2 |

# Case N = 5: Max = 7

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 5 | 5 | 0 |
| 2 | 3 | 1 | 2 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 6 | 5 | 1 |
| 2 | 2 | 2 | 0 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 7 | 5 | 2 |
| 2 | 3 | 2 | 1 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 3

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 8 | 5 | 3 |
| 2 | 4 | 2 | 2 |
| 3 | 2 | 111 | 1 |

## Bottles borrowed = 4

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 9 | 5 | 4 |
| 2 | 3 | 3 | 0 |

## Bottles borrowed = 5

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 10 | 5 | 5 |
| 2 | 4 | 3 | 1 |

## Bottles borrowed = 6

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 11 | 5 | 6 |
| 2 | 5 | 3 | 2 |

# Case N = 6: Max = 9

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 6 | 6 | 0 |
| 2 | 2 | 2 | 0 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 7 | 6 | 1 |
| 2 | 3 | 2 | 1 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 8 | 6 | 2 |
| 2 | 4 | 2 | 2 |
| 3 | 2 | 1 | 1 |

## Bottles borrowed = 3

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 9 | 6 | 3 |
| 2 | 3 | 3 | 0 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 4

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 10 | 6 | 4 |
| 2 | 4 | 3 | 1 |
| 3 | 2 | 1 | 1 |

## Bottles borrowed = 5

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 11 | 6 | 5 |
| 2 | 5 | 3 | 2 |
| 3 | 3 | 1 | 2 |

## Bottles borrowed = 6

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 12 | 6 | 6 |
| 2 | 4 | 4 | 0 |
| 3 | 2 | 1 | 1 |

# Case N = 7: Max = 10

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 7 | 7 | 0 |
| 2 | 3 | 2 | 1 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 8 | 7 | 1 |
| 2 | 4 | 2 | 2 |
| 3 | 2 | 1 | 1 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 9 | 7 | 2 |
| 2 | 3 | 3 | 0 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 3

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 10 | 7 | 3 |
| 2 | 4 | 3 | 1 |
| 3 | 2 | 1 | 1 |

# Case N = 8: Max = 12

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 8 | 8 | 0 |
| 2 | 4 | 2 | 2 |
| 3 | 2 | 1 | 1 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 9 | 8 | 1 |
| 2 | 3 | 3 | 0 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 10 | 8 | 2 |
| 2 | 4 | 3 | 1 |
| 3 | 1 | 1 | 1 |

# Case N = 9: Max = 13

## Bottles borrowed = 0

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 9 | 9 | 0 |
| 2 | 3 | 3 | 0 |
| 3 | 1 | 1 | 0 |

## Bottles borrowed = 1

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 10 | 9 | 1 |
| 2 | 4 | 3 | 1 |
| 3 | 2 | 1 | 1 |

## Bottles borrowed = 2

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 11 | 9 | 2 |
| 2 | 5 | 3 | 2 |
| 3 | 3 | 1 | 2 |

## Bottles borrowed = 3

|  |  |  |  |
| --- | --- | --- | --- |
| Iteration | Total bottles | Bottles redeemed | Carry-over bottles |
| 1 | 12 | 9 | 3 |
| 2 | 4 | 4 | 0 |
| 3 | 2 | 1 | 1 |