Getlowerbound:

| **Test Case Description** | **Equivalence Class** |
| --- | --- |
| **testGetLowerBound** | Range with lower bound = 0 and upper bound > 0 |
| **testGetLowerBoundForNegativeLowerBound** | Range with lower bound < 0 and upper bound > 0 |
| **testGetLowerBoundForZeroLowerBound** | Range with lower bound = 0 and upper bound > 0 |
| **testGetLowerBoundForUpperBoundEqualToLowerBound** | Range with lower bound = upper bound |
| **testGetLowerBoundForPositiveLowerBound** | Range with lower bound > 0 and upper bound > 0 |

Getlength:

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| --- | --- |
| **testGetLength** | Range with lower bound = 0 and upper bound > 0 |
| **testGetLengthForNegativeRange** | Range with lower bound < 0 and upper bound < 0 |
| **testGetLengthForZeroRange** | Range with lower bound = 0 and upper bound = 0 |
| **testGetLengthForUpperBoundEqualToLowerBound** | Range with lower bound = upper bound |
| **testGetLengthForPositiveRange** | Range with lower bound > 0 and upper bound > 0 |

Range Constructor:

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| --- | --- |
| **testValidRange** | Valid range with a lower bound less than the upper bound |
| **testInvalidRangeWithLowerBoundGreaterThanUpperBound** | Invalid range with a lower bound greater than the upper bound |
| **testInvalidRangeWithLowerBoundAsNaN** | Invalid range with a NaN lower bound |
| **testInvalidRangeWithUpperBoundAsNaN** | Invalid range with a NaN upper bound |
| **testInvalidRangeWithLowerBoundAsPositiveInfinity** | Invalid range with a positive infinity lower bound |
| **testInvalidRangeWithUpperBoundAsPositiveInfinity** | Invalid range with a positive infinity upper bound |
| **testInvalidRangeWithLowerBoundAsNegativeInfinity** | Invalid range with a negative infinity lower bound |
| **testInvalidRangeWithUpperBoundAsNegativeInfinity** | Invalid range with a negative infinity upper bound |

Get CentralValue

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| --- | --- |
| testGetCentralValueRange1 | Non-empty range with odd number of elements |
| testGetCentralValueRange2 | Non-empty range with even number of elements |
| testGetCentralValueRange3 | Single element range |

Contains:

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| --- | --- |
| testContainsInRange1 | Value within range |
| testContainsOutOfRange1 | Value outside range |
| testContainsInRange2 | Value within range |
| testContainsOutOfRange2 | Value outside range |
| testContainsSingleElementRange | Value within single element range |
| testContainsValueBelowRange | Value below range |
| testContainsValueAboveRange | Value above range |

Constrain:

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| --- | --- |
| testConstrainInRange1 | value within range [1, 10] |
| testConstrainOutOfRange1Lower | value below range [1, 10] |
| testConstrainOutOfRange1Upper | value above range [1, 10] |
| testConstrainInRange2 | value within range [-5, 5] |
| testConstrainOutOfRange2Lower | value below range [-5, 5] |
| testConstrainOutOfRange2Upper | value above range [-5, 5] |
| testConstrainInRange3 | single value range [0, 0] |
| testConstrainOutOfRange3 | value outside |

expandtoInclude:

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| --- | --- |
| testExpandToInclude1 | Range with non-zero lower and upper bounds |
| testExpandToInclude2 | Value is outside the original range |
| testExpandToInclude3 | Single value range |
| testExpandToInclude4 | Value is lower than the original lower bound |
| testExpandToInclude5 | Null input range |
| testExpandToInclude6 | Exception for null input range (not applicable) |