```
/*
===========================================================
==
* JFreeChart : a free chart library for the Java(tm)
platform
*
===========================================================
==
*
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Contributors.
*
* Project Info:
http://www.jfree.org/jfreechart/index.html
*
* This library is free software; you can redistribute it
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* the Free Software Foundation; either version 2.1 of the
License, or
* (at your option) any later version.
*

* This library is distributed in the hope that it will be
useful, but
* WITHOUT ANY WARRANTY; without even the implied warranty
of MERCHANTABILITY
```

```
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 * Contributor(s):   Peter Kolb (patch 2511330);


 *


 * Changes


 * -------


 * 05-Mar-2003 : Version 1 (DG);


 * 03-Mar-2005 : Moved createNumberArray() and
createNumberArray2D() methods

 *               from the DatasetUtilities class (DG);


 * 17-May-2005 : Added calculateColumnTotal() and
calculateRowTotal()

 *               methods (DG);


 * 28-Jan-2009 : Added equal(double[][], double[][])
method (DG);

 * 28-Jan-2009 : Added clone(double[][]) method (DG);


 * 04-Feb-2009 : Added calculateColumnTotal/RowTotal
variants (PK);

 * 03-Jul-2013 : Use ParamChecks (DG);


 *


 */
```

```
48

49    package org.jfree.data;

50

51    import java.util.Arrays;

52    import org.jfree.chart.util.ParamChecks;

53    import org.jfree.data.general.DatasetUtilities;

54

55    /**

56    * Utility methods for use with some of the data classes
      (but not the datasets,

57    * see {@link DatasetUtilities}).

58    */

59    public abstract class DataUtilities {

60

61        /**

62        * Tests two arrays for equality.  To be considered
           equal, the arrays must

63        * have exactly the same dimensions, and the values in
           each array must also
```

```java
     * match (two values that qre both NaN or both INF are
considered equal

     * in this test).

     *

     * @param a   the first array (<code>null</code>
permitted).

     * @param b   the second array (<code>null</code>
permitted).

     *

     * @return A boolean.

     *

     * @since 1.0.13

     */

    public static boolean equal(double[][] a, double[][]
b) {
        if (a == null) {
            return (b == null);
        }

        if (b == null) {
            return false;   // already know 'a' isn't null
```

```java
80              }
81   8          if (a.length != b.length) {
82   7              return false;
83              }
84   19         for (int i = 0; i < a.length; i++) {
85   19             if (!Arrays.equals(a[i], b[i])) {
86   7                 return false;
87                }
88              }
89   8          return true;
90          }

92      /**
93       * Returns a clone of the specified array.
94       *
95       * @param source  the source array (<code>null</code>
         not permitted).
```

```
         *

         * @return A clone of the array.

         *

         * @since 1.0.13

         */

    public static double[][] clone(double[][] source) {

        ParamChecks.nullNotPermitted(source, "source");

        double[][] clone = new double[source.length][];

        for (int i = 0; i < source.length; i++) {

            if (source[i] != null) {

                double[] row = new
double[source[i].length];

                System.arraycopy(source[i], 0, row, 0,
source[i].length);

                clone[i] = row;
```

```
109                 }

110            }

111   2        return clone;

112        }

113

114        /**

115         * Returns the total of the values in one column of
       the supplied data

116         * table.

117         *

118         * @param data  the table of values (<code>null</code>
       not permitted).

119         * @param column  the column index (zero-based).

120         *
```

```
     * @return The total of the values in the specified
column.

     */

    public static double calculateColumnTotal(Values2D
data, int column) {
        ParamChecks.nullNotPermitted(data, "data");

        double total = 0.0;

        int rowCount = data.getRowCount();

        for (int r = 0; r < rowCount; r++) {

            Number n = data.getValue(r, column);

            if (n != null) {

                total += n.doubleValue();

            }

        }
```

```
133    7        return total;

134          }

135

136        /**

137        * Returns the total of the values in one column of
          the supplied data

138        * table by taking only the row numbers in the array
          into account.

139        *

140        * @param data  the table of values (<code>null</code>
          not permitted).

141        * @param column  the column index (zero-based).

142        * @param validRows the array with valid rows
          (zero-based).

143        *

144        * @return The total of the valid values in the
          specified column.
```

```
145        *

146        * @since 1.0.13

147        */

148    public static double calculateColumnTotal(Values2D
       data, int column,

149            int[] validRows) {

150  1        ParamChecks.nullNotPermitted(data, "data");

151  5        double total = 0.0;

152  1        int rowCount = data.getRowCount();

153  20       for (int v = 0; v < validRows.length; v++) {

154  10           int row = validRows[v];

155  19           if (row < rowCount) {

156  11               Number n = data.getValue(row, column);
```

```java
157    4                    if (n != null) {

158    1                        total += n.doubleValue();
       3

159                        }

160                }

161            }

162    7            return total;

163        }

165        /**

166        * Returns the total of the values in one row of the
           supplied data

167        * table.

168        *
```

```
    * @param data  the table of values (<code>null</code>
not permitted).

    * @param row  the row index (zero-based).

    *

    * @return The total of the values in the specified
row.

    */

   public static double calculateRowTotal(Values2D data,
int row) {

        ParamChecks.nullNotPermitted(data, "data");

        double total = 0.0;

        int columnCount = data.getColumnCount();

        for (int c = 0; c < columnCount; c++) {

            Number n = data.getValue(row, c);

            if (n != null) {
```

```
                    total += n.doubleValue();

                }

            }

        return total;

    }


    /**
     * Returns the total of the values in one row of the
supplied data
     * table by taking only the column numbers in the
array into account.
     *
     * @param data  the table of values (<code>null</code>
not permitted).
     * @param row  the row index (zero-based).
```

```
     * @param validCols the array with valid cols
(zero-based).

     *

     * @return The total of the valid values in the
specified row.

     *

     * @since 1.0.13

     */

    public static double calculateRowTotal(Values2D data,
int row,

            int[] validCols) {
        ParamChecks.nullNotPermitted(data, "data");

        double total = 0.0;

        int colCount = data.getColumnCount();

        for (int v = 0; v < validCols.length; v++) {
```

```
2205    10              int col = validCols[v];

2206    19              if (col < colCount) {

2207    11                  Number n = data.getValue(row, col);

2208    4                   if (n != null) {

2209    13                      total += n.doubleValue();

2210                        }

2211                    }

2212                }

2213    7          return total;

2214        }

2215

2216        /**
```

```
     * Constructs an array of <code>Number</code> objects
from an array of

     * <code>double</code> primitives.

     *

     * @param data  the data (<code>null</code> not
permitted).

     *

     * @return An array of <code>Double</code>.

     */

    public static Number[] createNumberArray(double[]
data) {
        ParamChecks.nullNotPermitted(data, "data");

        Number[] result = new Number[data.length];

        for (int i = 0; i < data.length; i++) {

            result[i] = new Double(data[i]);
```

```
            }

229

230   2       return result;

231       }

232


233       /**

234         * Constructs an array of arrays of
          <code>Number</code> objects from a

235         * corresponding structure containing
          <code>double</code> primitives.

236         *

237         * @param data  the data (<code>null</code> not
          permitted).

238         *

239         * @return An array of <code>Double</code>.

240         */
```

```java
    public static Number[][]
createNumberArray2D(double[][] data) {
        ParamChecks.nullNotPermitted(data, "data");

        int l1 = data.length;

        Number[][] result = new Number[l1][];

        for (int i = 0; i < l1; i++) {

            result[i] = createNumberArray(data[i]);

        }

        return result;

    }



    /**

     * Returns a {@link KeyedValues} instance that
contains the cumulative
```

```
      * percentage values for the data in another {@link
KeyedValues} instance.

      * <p>


      * The percentages are values between 0.0 and 1.0
(where 1.0 = 100%).


      *


      * @param data  the data (<code>null</code> not
permitted).


      *


      * @return The cumulative percentages.


      */


    public static KeyedValues
getCumulativePercentages(KeyedValues data) {

        ParamChecks.nullNotPermitted(data, "data");


        DefaultKeyedValues result = new
DefaultKeyedValues();


        double total = 0.0;
```

```java
265  20          for (int i = 0; i < data.getItemCount(); i++) {

266  6              Number v = data.getValue(i);

267  4              if (v != null) {

268  13                  total = total + v.doubleValue();

269              }

270          }

271  5          double runningTotal = 0.0;

272  20          for (int i = 0; i < data.getItemCount(); i++) {

273  6              Number v = data.getValue(i);

274  4              if (v != null) {

275  13                  runningTotal = runningTotal +
     v.doubleValue();

276              }
```

```
277    25            result.addValue(data.getKey(i), new
       Double(runningTotal / total));

278            }

279    2        return result;

280        }

281

282    }
```

Mutations

7 6	1. replaced boolean return with false for org/jfree/data/DataUtilities::equal → KILLED 2. replaced boolean return with true for org/jfree/data/DataUtilities::equal → KILLED 3. Substituted 1 with 0 → KILLED 4. Substituted 0 with 1 → KILLED 5. negated conditional → KILLED 6. removed conditional - replaced equality check with false → KILLED 7. removed conditional - replaced equality check with true → KILLED 8. replaced return of integer sized value with (x == 0 ? 1 : 0) → KILLED 9. replaced return of integer sized value with (x == 0 ? 1 : 0) → KILLED 10. Substituted 0 with 1 → KILLED 11. Substituted 1 with 0 → KILLED 12. Substituted 1 with -1 → SURVIVED 13. Substituted 0 with -1 → KILLED 14. Substituted 1 with -1 → SURVIVED 15. Substituted 1 with 2 → KILLED 16. Substituted 0 with 1 → KILLED 17. Substituted 1 with 0 → KILLED 18. Substituted 0 with -1 → KILLED 19. not equal to equal → KILLED
7 8	1. negated conditional → KILLED 2. removed conditional - replaced equality check with false → KILLED 3. removed conditional - replaced equality check with true → KILLED 4. not equal to equal → KILLED
7 9	1. replaced boolean return with true for org/jfree/data/DataUtilities::equal → KILLED 2. Substituted 0 with 1 → KILLED 3. replaced return of integer sized value with (x == 0 ? 1 : 0) → KILLED 4. Substituted 0 with 1 → KILLED 5. Substituted 0 with -1 → KILLED 6. Substituted 0 with 1 → KILLED

```
                7. Substituted 0 with -1 → KILLED

8   1. negated conditional → KILLED
1   2. removed conditional - replaced equality check with
    false → KILLED
    3. removed conditional - replaced equality check with
    true → KILLED
    4. equal to less than → KILLED
    5. equal to less or equal → KILLED
    6. equal to greater than → KILLED
    7. equal to greater or equal → SURVIVED
    8. equal to not equal → KILLED

8   1. replaced boolean return with true for
2   org/jfree/data/DataUtilities::equal → KILLED
    2. Substituted 0 with 1 → KILLED
    3. replaced return of integer sized value with (x == 0 ?
    1 : 0) → KILLED
    4. Substituted 0 with 1 → KILLED
    5. Substituted 0 with -1 → KILLED
    6. Substituted 0 with 1 → KILLED
    7. Substituted 0 with -1 → KILLED

8   1. changed conditional boundary → KILLED
4   2. Substituted 0 with 1 → SURVIVED
    3. negated conditional → KILLED
    4. removed conditional - replaced comparison check with
    false → KILLED
    5. removed conditional - replaced comparison check with
    true → KILLED
    6. Negated integer local variable number 2 → KILLED
    7. Substituted 0 with 1 → SURVIVED
    8. Substituted 0 with -1 → KILLED
    9. Substituted 0 with 1 → SURVIVED
    10. Substituted 0 with -1 → KILLED
    11. Less than to less or equal → KILLED
    12. Less than to greater than → KILLED
    13. Less than to greater or equal → KILLED
    14. Less than to equal → KILLED
    15. Less than to not equal → SURVIVED
```

	16. Incremented (a++) integer local variable number 2 → SURVIVED
	17. Decremented (a--) integer local variable number 2 → KILLED
	18. Incremented (++a) integer local variable number 2 → SURVIVED
	19. Decremented (--a) integer local variable number 2 → KILLED
8 5	1. negated conditional → KILLED 2. removed call to java/util/Arrays::equals → KILLED 3. removed conditional - replaced equality check with false → KILLED 4. removed conditional - replaced equality check with true → KILLED 5. Negated integer local variable number 2 → KILLED 6. Negated integer local variable number 2 → KILLED 7. not equal to less than → KILLED 8. not equal to less or equal → KILLED 9. not equal to greater than → SURVIVED 10. not equal to greater or equal → KILLED 11. not equal to equal → KILLED 12. Incremented (a++) integer local variable number 2 → KILLED 13. Incremented (a++) integer local variable number 2 → KILLED 14. Decremented (a--) integer local variable number 2 → KILLED 15. Decremented (a--) integer local variable number 2 → TIMED_OUT 16. Incremented (++a) integer local variable number 2 → SURVIVED 17. Incremented (++a) integer local variable number 2 → KILLED 18. Decremented (--a) integer local variable number 2 → KILLED 19. Decremented (--a) integer local variable number 2 → KILLED

8 6	1. replaced boolean return with true for org/jfree/data/DataUtilities::equal → KILLED 2. Substituted 0 with 1 → KILLED 3. replaced return of integer sized value with (x == 0 ? 1 : 0) → KILLED 4. Substituted 0 with 1 → KILLED 5. Substituted 0 with -1 → KILLED 6. Substituted 0 with 1 → KILLED 7. Substituted 0 with -1 → KILLED
8 9	1. replaced boolean return with false for org/jfree/data/DataUtilities::equal → KILLED 2. Substituted 1 with 0 → KILLED 3. replaced return of integer sized value with (x == 0 ? 1 : 0) → KILLED 4. Substituted 1 with 0 → KILLED 5. Substituted 1 with -1 → SURVIVED 6. Substituted 1 with -1 → SURVIVED 7. Substituted 1 with 2 → KILLED 8. Substituted 1 with 0 → KILLED
1 0 2	1. removed call to org/jfree/chart/util/ParamChecks::nullNotPermitted → SURVIVED

104	1. changed conditional boundary → KILLED 2. Substituted 0 with 1 → KILLED 3. negated conditional → KILLED 4. removed conditional - replaced comparison check with false → KILLED 5. removed conditional - replaced comparison check with true → KILLED 6. Negated integer local variable number 2 → KILLED 7. Substituted 0 with 1 → KILLED 8. Substituted 0 with -1 → KILLED 9. Substituted 0 with 1 → KILLED 10. Substituted 0 with -1 → KILLED 11. Less than to less or equal → KILLED 12. Less than to greater than → KILLED 13. Less than to greater or equal → KILLED 14. Less than to equal → KILLED 15. Less than to not equal → SURVIVED 16. Incremented (a++) integer local variable number 2 → KILLED 17. Decremented (a--) integer local variable number 2 → KILLED 18. Incremented (++a) integer local variable number 2 → KILLED 19. Decremented (--a) integer local variable number 2 → KILLED
105	1. negated conditional → KILLED 2. removed conditional - replaced equality check with false → KILLED 3. removed conditional - replaced equality check with true → KILLED 4. Negated integer local variable number 2 → KILLED 5. equal to not equal → KILLED 6. Incremented (a++) integer local variable number 2 → KILLED 7. Decremented (a--) integer local variable number 2 → KILLED 8. Incremented (++a) integer local variable number 2 → KILLED 9. Decremented (--a) integer local variable number 2 → KILLED

106	1. Negated integer local variable number 2 → KILLED
	2. Incremented (a++) integer local variable number 2 → KILLED
	3. Decremented (a--) integer local variable number 2 → KILLED
	4. Incremented (++a) integer local variable number 2 → KILLED
	5. Decremented (--a) integer local variable number 2 → KILLED

107	1. Substituted 0 with 1 → KILLED
	2. Substituted 0 with 1 → KILLED
	3. removed call to java/lang/System::arraycopy → KILLED
	4. Negated integer local variable number 2 → KILLED
	5. Negated integer local variable number 2 → KILLED
	6. Substituted 0 with 1 → KILLED
	7. Substituted 0 with 1 → KILLED
	8. Substituted 0 with -1 → KILLED
	9. Substituted 0 with -1 → KILLED
	10. Substituted 0 with 1 → KILLED
	11. Substituted 0 with 1 → KILLED
	12. Substituted 0 with -1 → KILLED
	13. Substituted 0 with -1 → KILLED
	14. Incremented (a++) integer local variable number 2 → KILLED
	15. Incremented (a++) integer local variable number 2 → KILLED
	16. Decremented (a--) integer local variable number 2 → KILLED
	17. Decremented (a--) integer local variable number 2 → KILLED
	18. Incremented (++a) integer local variable number 2 → KILLED
	19. Incremented (++a) integer local variable number 2 → KILLED
	20. Decremented (--a) integer local variable number 2 → KILLED
	21. Decremented (--a) integer local variable number 2 → KILLED

108	1. Negated integer local variable number 2 → KILLED 2. Incremented (a++) integer local variable number 2 → KILLED 3. Decremented (a--) integer local variable number 2 → TIMED_OUT 4. Incremented (++a) integer local variable number 2 → KILLED 5. Decremented (--a) integer local variable number 2 → KILLED
111	1. replaced return value with null for org/jfree/data/DataUtilities::clone → KILLED 2. mutated return of Object value for org/jfree/data/DataUtilities::clone to (if (x != null) null else throw new RuntimeException) → KILLED
124	1. removed call to org/jfree/chart/util/ParamChecks::nullNotPermitted → SURVIVED
125	1. Substituted 0.0 with 1.0 → KILLED 2. Substituted 0.0 with 1.0 → KILLED 3. Substituted 0.0 with -1.0 → KILLED 4. Substituted 0.0 with 1.0 → KILLED 5. Substituted 0.0 with -1.0 → KILLED
126	1. removed call to org/jfree/data/Values2D::getRowCount → KILLED

```
1      1. changed conditional boundary → KILLED
2      2. Changed increment from 1 to -1 → KILLED
7      3. Substituted 0 with 1 → KILLED
       4. negated conditional → KILLED
       5. removed conditional - replaced comparison check with
       false → KILLED
       6. removed conditional - replaced comparison check with
       true → KILLED
       7. Negated integer local variable number 5 → KILLED
       8. Negated integer local variable number 4 → KILLED
       9. Substituted 0 with 1 → KILLED
       10. Substituted 0 with -1 → KILLED
       11. Substituted 0 with 1 → KILLED
       12. Substituted 0 with -1 → KILLED
       13. Less than to less or equal → KILLED
       14. Less than to greater than → KILLED
       15. Less than to greater or equal → KILLED
       16. Less than to equal → KILLED
       17. Less than to not equal → SURVIVED
       18. Incremented (a++) integer local variable number 5 →
       KILLED
       19. Incremented (a++) integer local variable number 4 →
       KILLED
       20. Decremented (a--) integer local variable number 5 →
       KILLED
       21. Decremented (a--) integer local variable number 4 →
       KILLED
       22. Incremented (++a) integer local variable number 5 →
       KILLED
       23. Incremented (++a) integer local variable number 4 →
       KILLED
       24. Decremented (--a) integer local variable number 5 →
       KILLED
       25. Decremented (--a) integer local variable number 4 →
       KILLED
```

1 2 8	1. removed call to org/jfree/data/Values2D::getValue → KILLED 2. Negated integer local variable number 5 → KILLED 3. Negated integer local variable number 1 → SURVIVED 4. Incremented (a++) integer local variable number 5 → KILLED 5. Incremented (a++) integer local variable number 1 → KILLED 6. Decremented (a--) integer local variable number 5 → KILLED 7. Decremented (a--) integer local variable number 1 → KILLED 8. Incremented (++a) integer local variable number 5 → KILLED 9. Incremented (++a) integer local variable number 1 → KILLED 10. Decremented (--a) integer local variable number 5 → KILLED 11. Decremented (--a) integer local variable number 1 → KILLED
1 2 9	1. negated conditional → KILLED 2. removed conditional - replaced equality check with false → KILLED 3. removed conditional - replaced equality check with true → KILLED 4. equal to not equal → KILLED
1 3 0	1. Replaced double addition with subtraction → KILLED 2. removed call to java/lang/Number::doubleValue → KILLED 3. Negated double local variable number 2 → KILLED 4. Replaced double operation with first member → KILLED 5. Replaced double operation by second member → KILLED 6. Replaced double addition with subtraction → KILLED 7. Replaced double addition with multiplication → KILLED 8. Replaced double addition with division → KILLED 9. Replaced double addition with modulus → KILLED 10. Incremented (a++) double local variable number 2 → SURVIVED 11. Decremented (a--) double local variable number 2 → SURVIVED

	12. Incremented (++a) double local variable number 2 → KILLED 13. Decremented (--a) double local variable number 2 → KILLED
133	1. replaced double return with 0.0d for org/jfree/data/DataUtilities::calculateColumnTotal → KILLED 2. replaced return of double value with -(x + 1) for org/jfree/data/DataUtilities::calculateColumnTotal → KILLED 3. Negated double local variable number 2 → KILLED 4. Incremented (a++) double local variable number 2 → SURVIVED 5. Decremented (a--) double local variable number 2 → SURVIVED 6. Incremented (++a) double local variable number 2 → KILLED 7. Decremented (--a) double local variable number 2 → KILLED
150	1. removed call to org/jfree/chart/util/ParamChecks::nullNotPermitted → SURVIVED
151	1. Substituted 0.0 with 1.0 → KILLED 2. Substituted 0.0 with 1.0 → KILLED 3. Substituted 0.0 with -1.0 → KILLED 4. Substituted 0.0 with 1.0 → KILLED 5. Substituted 0.0 with -1.0 → KILLED
152	1. removed call to org/jfree/data/Values2D::getRowCount → KILLED

1
5
3

1. changed conditional boundary → KILLED
2. Changed increment from 1 to -1 → KILLED
3. Substituted 0 with 1 → KILLED
4. negated conditional → KILLED
5. removed conditional - replaced comparison check with false → KILLED
6. removed conditional - replaced comparison check with true → KILLED
7. Negated integer local variable number 6 → KILLED
8. Substituted 0 with 1 → KILLED
9. Substituted 0 with -1 → KILLED
10. Substituted 0 with 1 → KILLED
11. Substituted 0 with -1 → KILLED
12. Less than to less or equal → KILLED
13. Less than to greater than → KILLED
14. Less than to greater or equal → KILLED
15. Less than to equal → KILLED
16. Less than to not equal → SURVIVED
17. Incremented (a++) integer local variable number 6 → KILLED
18. Decremented (a--) integer local variable number 6 → KILLED
19. Incremented (++a) integer local variable number 6 → KILLED
20. Decremented (--a) integer local variable number 6 → KILLED

1
5
4

1. Negated integer local variable number 6 → KILLED
2. Negated integer array field → KILLED
3. Incremented (a++) integer local variable number 6 → KILLED
4. Incremented (a++) integer array field → SURVIVED
5. Decremented (a--) integer local variable number 6 → KILLED
6. Decremented (a--) integer array field → SURVIVED
7. Incremented (++a) integer local variable number 6 → KILLED
8. Incremented (++a) integer array field → KILLED
9. Decremented (--a) integer local variable number 6 → KILLED
10. Decremented (--a) integer array field → KILLED

1. changed conditional boundary → SURVIVED
2. negated conditional → KILLED
3. removed conditional - replaced comparison check with false → KILLED
4. removed conditional - replaced comparison check with true → KILLED
5. Negated integer local variable number 7 → KILLED
6. Negated integer local variable number 5 → KILLED
7. greater or equal to less than → KILLED
8. greater or equal to less or equal → KILLED
9. greater or equal to greater than → SURVIVED
10. greater or equal to equal → KILLED
11. greater or equal to not equal → KILLED
12. Incremented (a++) integer local variable number 7 → KILLED
13. Incremented (a++) integer local variable number 5 → SURVIVED
14. Decremented (a--) integer local variable number 7 → KILLED
15. Decremented (a--) integer local variable number 5 → KILLED
16. Incremented (++a) integer local variable number 7 → KILLED
17. Incremented (++a) integer local variable number 5 → SURVIVED
18. Decremented (--a) integer local variable number 7 → KILLED
19. Decremented (--a) integer local variable number 5 → KILLED

1. removed call to org/jfree/data/Values2D::getValue → KILLED
2. Negated integer local variable number 7 → KILLED
3. Negated integer local variable number 1 → SURVIVED
4. Incremented (a++) integer local variable number 7 → SURVIVED
5. Incremented (a++) integer local variable number 1 → KILLED
6. Decremented (a--) integer local variable number 7 → SURVIVED

7. Decremented (a--) integer local variable number 1 → KILLED
8. Incremented (++a) integer local variable number 7 → KILLED
9. Incremented (++a) integer local variable number 1 → KILLED
10. Decremented (--a) integer local variable number 7 → KILLED
11. Decremented (--a) integer local variable number 1 → KILLED

1
5
7

1. negated conditional → KILLED
2. removed conditional - replaced equality check with false → KILLED
3. removed conditional - replaced equality check with true → KILLED
4. equal to not equal → KILLED

1
5
8

1. Replaced double addition with subtraction → KILLED
2. removed call to java/lang/Number::doubleValue → KILLED
3. Negated double local variable number 3 → KILLED
4. Replaced double operation with first member → KILLED
5. Replaced double operation by second member → KILLED
6. Replaced double addition with subtraction → KILLED
7. Replaced double addition with multiplication → KILLED
8. Replaced double addition with division → KILLED
9. Replaced double addition with modulus → KILLED
10. Incremented (a++) double local variable number 3 → SURVIVED
11. Decremented (a--) double local variable number 3 → SURVIVED
12. Incremented (++a) double local variable number 3 → KILLED
13. Decremented (--a) double local variable number 3 → KILLED

1 6 2	1. replaced double return with 0.0d for org/jfree/data/DataUtilities::calculateColumnTotal → KILLED 2. replaced return of double value with -(x + 1) for org/jfree/data/DataUtilities::calculateColumnTotal → KILLED 3. Negated double local variable number 3 → KILLED 4. Incremented (a++) double local variable number 3 → SURVIVED 5. Decremented (a--) double local variable number 3 → SURVIVED 6. Incremented (++a) double local variable number 3 → KILLED 7. Decremented (--a) double local variable number 3 → KILLED
1 7 5	1. removed call to org/jfree/chart/util/ParamChecks::nullNotPermitted → SURVIVED
1 7 6	1. Substituted 0.0 with 1.0 → KILLED 2. Substituted 0.0 with 1.0 → KILLED 3. Substituted 0.0 with -1.0 → KILLED 4. Substituted 0.0 with 1.0 → KILLED 5. Substituted 0.0 with -1.0 → KILLED
1 7 7	1. removed call to org/jfree/data/Values2D::getColumnCount → KILLED

```
1     1. changed conditional boundary → KILLED
7     2. Changed increment from 1 to -1 → KILLED
8     3. Substituted 0 with 1 → KILLED
      4. negated conditional → KILLED
      5. removed conditional - replaced comparison check with
      false → KILLED
      6. removed conditional - replaced comparison check with
      true → KILLED
      7. Negated integer local variable number 5 → KILLED
      8. Negated integer local variable number 4 → KILLED
      9. Substituted 0 with 1 → KILLED
      10. Substituted 0 with -1 → KILLED
      11. Substituted 0 with 1 → KILLED
      12. Substituted 0 with -1 → KILLED
      13. Less than to less or equal → KILLED
      14. Less than to greater than → KILLED
      15. Less than to greater or equal → KILLED
      16. Less than to equal → KILLED
      17. Less than to not equal → SURVIVED
      18. Incremented (a++) integer local variable number 5 →
      KILLED
      19. Incremented (a++) integer local variable number 4 →
      KILLED
      20. Decremented (a--) integer local variable number 5 →
      KILLED
      21. Decremented (a--) integer local variable number 4 →
      KILLED
      22. Incremented (++a) integer local variable number 5 →
      KILLED
      23. Incremented (++a) integer local variable number 4 →
      KILLED
      24. Decremented (--a) integer local variable number 5 →
      KILLED
      25. Decremented (--a) integer local variable number 4 →
      KILLED
```

1 7 9	1. removed call to org/jfree/data/Values2D::getValue → KILLED
	2. Negated integer local variable number 1 → SURVIVED
	3. Negated integer local variable number 5 → KILLED
	4. Incremented (a++) integer local variable number 1 → KILLED
	5. Incremented (a++) integer local variable number 5 → KILLED
	6. Decremented (a--) integer local variable number 1 → KILLED
	7. Decremented (a--) integer local variable number 5 → KILLED
	8. Incremented (++a) integer local variable number 1 → KILLED
	9. Incremented (++a) integer local variable number 5 → KILLED
	10. Decremented (--a) integer local variable number 1 → KILLED
	11. Decremented (--a) integer local variable number 5 → KILLED
1 8 0	1. negated conditional → KILLED
	2. removed conditional - replaced equality check with false → KILLED
	3. removed conditional - replaced equality check with true → SURVIVED
	4. equal to not equal → KILLED
1 8 1	1. Replaced double addition with subtraction → KILLED
	2. removed call to java/lang/Number::doubleValue → KILLED
	3. Negated double local variable number 2 → KILLED
	4. Replaced double operation with first member → KILLED
	5. Replaced double operation by second member → KILLED
	6. Replaced double addition with subtraction → KILLED
	7. Replaced double addition with multiplication → KILLED
	8. Replaced double addition with division → KILLED
	9. Replaced double addition with modulus → KILLED
	10. Incremented (a++) double local variable number 2 → SURVIVED
	11. Decremented (a--) double local variable number 2 → SURVIVED

	12. Incremented (++a) double local variable number 2 → KILLED
	13. Decremented (--a) double local variable number 2 → KILLED
184	1. replaced double return with 0.0d for org/jfree/data/DataUtilities::calculateRowTotal → KILLED
	2. replaced return of double value with -(x + 1) for org/jfree/data/DataUtilities::calculateRowTotal → KILLED
	3. Negated double local variable number 2 → KILLED
	4. Incremented (a++) double local variable number 2 → SURVIVED
	5. Decremented (a--) double local variable number 2 → SURVIVED
	6. Incremented (++a) double local variable number 2 → KILLED
	7. Decremented (--a) double local variable number 2 → KILLED
201	1. removed call to org/jfree/chart/util/ParamChecks::nullNotPermitted → SURVIVED
202	1. Substituted 0.0 with 1.0 → KILLED
	2. Substituted 0.0 with 1.0 → KILLED
	3. Substituted 0.0 with -1.0 → KILLED
	4. Substituted 0.0 with 1.0 → KILLED
	5. Substituted 0.0 with -1.0 → KILLED
203	1. removed call to org/jfree/data/Values2D::getColumnCount → KILLED

1. changed conditional boundary → KILLED
2. Changed increment from 1 to -1 → KILLED
3. Substituted 0 with 1 → KILLED
4. negated conditional → KILLED
5. removed conditional - replaced comparison check with false → KILLED
6. removed conditional - replaced comparison check with true → KILLED
7. Negated integer local variable number 6 → KILLED
8. Substituted 0 with 1 → KILLED
9. Substituted 0 with -1 → KILLED
10. Substituted 0 with 1 → KILLED
11. Substituted 0 with -1 → KILLED
12. Less than to less or equal → KILLED
13. Less than to greater than → KILLED
14. Less than to greater or equal → KILLED
15. Less than to equal → KILLED
16. Less than to not equal → SURVIVED
17. Incremented (a++) integer local variable number 6 → KILLED
18. Decremented (a--) integer local variable number 6 → KILLED
19. Incremented (++a) integer local variable number 6 → KILLED
20. Decremented (--a) integer local variable number 6 → KILLED

1. Negated integer local variable number 6 → KILLED
2. Negated integer array field → KILLED
3. Incremented (a++) integer local variable number 6 → KILLED
4. Incremented (a++) integer array field → SURVIVED
5. Decremented (a--) integer local variable number 6 → KILLED
6. Decremented (a--) integer array field → SURVIVED
7. Incremented (++a) integer local variable number 6 → KILLED
8. Incremented (++a) integer array field → KILLED
9. Decremented (--a) integer local variable number 6 → KILLED
10. Decremented (--a) integer array field → KILLED

2 0 6	1. changed conditional boundary → SURVIVED
	2. negated conditional → KILLED
	3. removed conditional - replaced comparison check with false → KILLED
	4. removed conditional - replaced comparison check with true → SURVIVED
	5. Negated integer local variable number 7 → SURVIVED
	6. Negated integer local variable number 5 → KILLED
	7. greater or equal to less than → KILLED
	8. greater or equal to less or equal → KILLED
	9. greater or equal to greater than → SURVIVED
	10. greater or equal to equal → SURVIVED
	11. greater or equal to not equal → KILLED
	12. Incremented (a++) integer local variable number 7 → KILLED
	13. Incremented (a++) integer local variable number 5 → SURVIVED
	14. Decremented (a--) integer local variable number 7 → KILLED
	15. Decremented (a--) integer local variable number 5 → KILLED
	16. Incremented (++a) integer local variable number 7 → KILLED
	17. Incremented (++a) integer local variable number 5 → SURVIVED
	18. Decremented (--a) integer local variable number 7 → KILLED
	19. Decremented (--a) integer local variable number 5 → KILLED
2 0 7	1. removed call to org/jfree/data/Values2D::getValue → KILLED
	2. Negated integer local variable number 1 → SURVIVED
	3. Negated integer local variable number 7 → KILLED
	4. Incremented (a++) integer local variable number 1 → KILLED
	5. Incremented (a++) integer local variable number 7 → SURVIVED
	6. Decremented (a--) integer local variable number 1 → KILLED

	7. Decremented (a--) integer local variable number 7 → SURVIVED
	8. Incremented (++a) integer local variable number 1 → KILLED 9. Incremented (++a) integer local variable number 7 → KILLED 10. Decremented (--a) integer local variable number 1 → KILLED 11. Decremented (--a) integer local variable number 7 → KILLED
208	1. negated conditional → KILLED 2. removed conditional - replaced equality check with false → KILLED
	3. removed conditional - replaced equality check with true → SURVIVED
	4. equal to not equal → KILLED
209	1. Replaced double addition with subtraction → KILLED 2. removed call to java/lang/Number::doubleValue → KILLED 3. Negated double local variable number 3 → KILLED 4. Replaced double operation with first member → KILLED 5. Replaced double operation by second member → KILLED 6. Replaced double addition with subtraction → KILLED 7. Replaced double addition with multiplication → KILLED 8. Replaced double addition with division → KILLED 9. Replaced double addition with modulus → KILLED
	10. Incremented (a++) double local variable number 3 → SURVIVED 11. Decremented (a--) double local variable number 3 → SURVIVED
	12. Incremented (++a) double local variable number 3 → KILLED 13. Decremented (--a) double local variable number 3 → KILLED

2 1 3	1. replaced double return with 0.0d for org/jfree/data/DataUtilities::calculateRowTotal → KILLED 2. replaced return of double value with -(x + 1) for org/jfree/data/DataUtilities::calculateRowTotal → KILLED 3. Negated double local variable number 3 → KILLED
	4. Incremented (a++) double local variable number 3 → SURVIVED 5. Decremented (a--) double local variable number 3 → SURVIVED
	6. Incremented (++a) double local variable number 3 → KILLED 7. Decremented (--a) double local variable number 3 → KILLED
2 2 5	1. removed call to org/jfree/chart/util/ParamChecks::nullNotPermitted → SURVIVED
2 2 7	1. changed conditional boundary → KILLED 2. Substituted 0 with 1 → KILLED 3. negated conditional → KILLED 4. removed conditional - replaced comparison check with false → KILLED 5. removed conditional - replaced comparison check with true → KILLED 6. Negated integer local variable number 2 → KILLED 7. Substituted 0 with 1 → KILLED 8. Substituted 0 with -1 → KILLED 9. Substituted 0 with 1 → KILLED 10. Substituted 0 with -1 → KILLED 11. Less than to less or equal → KILLED 12. Less than to greater than → KILLED 13. Less than to greater or equal → KILLED 14. Less than to equal → KILLED
	15. Less than to not equal → SURVIVED
	16. Incremented (a++) integer local variable number 2 → KILLED 17. Decremented (a--) integer local variable number 2 → KILLED 18. Incremented (++a) integer local variable number 2 → KILLED

	19. Decremented (--a) integer local variable number 2 → KILLED
228	1. removed call to java/lang/Double::<init> → KILLED 2. Negated integer local variable number 2 → KILLED 3. Negated integer local variable number 2 → KILLED 4. Negated double array field → KILLED 5. Incremented (a++) integer local variable number 2 → KILLED 6. Incremented (a++) integer local variable number 2 → KILLED 7. Incremented (a++) double array field → SURVIVED 8. Decremented (a--) integer local variable number 2 → KILLED 9. Decremented (a--) integer local variable number 2 → TIMED_OUT 10. Decremented (a--) double array field → SURVIVED 11. Incremented (++a) integer local variable number 2 → KILLED 12. Incremented (++a) integer local variable number 2 → KILLED 13. Incremented (++a) double array field → KILLED 14. Decremented (--a) integer local variable number 2 → KILLED 15. Decremented (--a) integer local variable number 2 → KILLED 16. Decremented (--a) double array field → KILLED
230	1. replaced return value with null for org/jfree/data/DataUtilities::createNumberArray → KILLED 2. mutated return of Object value for org/jfree/data/DataUtilities::createNumberArray to (if (x != null) null else throw new RuntimeException) → KILLED
242	1. removed call to org/jfree/chart/util/ParamChecks::nullNotPermitted → SURVIVED

2 4 4	1. Negated integer local variable number 1 → KILLED
	2. Incremented (a++) integer local variable number 1 → KILLED
	3. Decremented (a--) integer local variable number 1 → SURVIVED
	4. Incremented (++a) integer local variable number 1 → KILLED
	5. Decremented (--a) integer local variable number 1 → KILLED
2 4 5	1. changed conditional boundary → KILLED
	2. Changed increment from 1 to -1 → KILLED
	3. Substituted 0 with 1 → SURVIVED
	4. negated conditional → SURVIVED
	5. removed conditional - replaced comparison check with false → KILLED
	6. removed conditional - replaced comparison check with true → SURVIVED
	7. Negated integer local variable number 3 → KILLED
	8. Negated integer local variable number 1 → SURVIVED
	9. Substituted 0 with 1 → SURVIVED
	10. Substituted 0 with -1 → KILLED
	11. Substituted 0 with 1 → SURVIVED
	12. Substituted 0 with -1 → KILLED
	13. Less than to less or equal → KILLED
	14. Less than to greater than → SURVIVED
	15. Less than to greater or equal → SURVIVED
	16. Less than to equal → SURVIVED
	17. Less than to not equal → SURVIVED
	18. Incremented (a++) integer local variable number 3 → SURVIVED
	19. Incremented (a++) integer local variable number 1 → KILLED
	20. Decremented (a--) integer local variable number 3 → KILLED
	21. Decremented (a--) integer local variable number 1 → SURVIVED
	22. Incremented (++a) integer local variable number 3 → SURVIVED
	23. Incremented (++a) integer local variable number 1 → KILLED

	24. Decremented (--a) integer local variable number 3 → KILLED
	25. Decremented (--a) integer local variable number 1 → SURVIVED
2 4 6	1. removed call to org/jfree/data/DataUtilities::createNumberArray → SURVIVED
	2. Negated integer local variable number 3 → KILLED
	3. Negated integer local variable number 3 → KILLED
	4. Incremented (a++) integer local variable number 3 → SURVIVED
	5. Incremented (a++) integer local variable number 3 → SURVIVED
	6. Decremented (a--) integer local variable number 3 → KILLED
	7. Decremented (a--) integer local variable number 3 → TIMED_OUT
	8. Incremented (++a) integer local variable number 3 → SURVIVED
	9. Incremented (++a) integer local variable number 3 → SURVIVED
	10. Decremented (--a) integer local variable number 3 → KILLED
	11. Decremented (--a) integer local variable number 3 → KILLED
2 4 8	1. replaced return value with null for org/jfree/data/DataUtilities::createNumberArray2D → KILLED
	2. mutated return of Object value for org/jfree/data/DataUtilities::createNumberArray2D to (if (x != null) null else throw new RuntimeException) → KILLED
2 6 2	1. removed call to org/jfree/chart/util/ParamChecks::nullNotPermitted → SURVIVED
2 6 3	1. removed call to org/jfree/data/DefaultKeyedValues::<init> → KILLED

2 6 4	1. Substituted 0.0 with 1.0 → KILLED 2. Substituted 0.0 with 1.0 → KILLED 3. Substituted 0.0 with -1.0 → KILLED 4. Substituted 0.0 with 1.0 → KILLED 5. Substituted 0.0 with -1.0 → KILLED
2 6 5	1. changed conditional boundary → KILLED 2. Substituted 0 with 1 → KILLED 3. negated conditional → KILLED 4. removed call to org/jfree/data/KeyedValues::getItemCount → KILLED 5. removed conditional - replaced comparison check with false → KILLED 6. removed conditional - replaced comparison check with true → KILLED 7. Negated integer local variable number 4 → KILLED 8. Substituted 0 with 1 → KILLED 9. Substituted 0 with -1 → KILLED 10. Substituted 0 with 1 → KILLED 11. Substituted 0 with -1 → KILLED 12. Less than to less or equal → KILLED 13. Less than to greater than → KILLED 14. Less than to greater or equal → KILLED 15. Less than to equal → KILLED 16. Less than to not equal → SURVIVED 17. Incremented (a++) integer local variable number 4 → KILLED 18. Decremented (a--) integer local variable number 4 → KILLED 19. Incremented (++a) integer local variable number 4 → KILLED 20. Decremented (--a) integer local variable number 4 → KILLED
2 6 6	1. removed call to org/jfree/data/KeyedValues::getValue → KILLED 2. Negated integer local variable number 4 → KILLED 3. Incremented (a++) integer local variable number 4 → KILLED 4. Decremented (a--) integer local variable number 4 → TIMED_OUT

5. Incremented (++a) integer local variable number 4 → KILLED
6. Decremented (--a) integer local variable number 4 → KILLED

2
6
7

1. negated conditional → KILLED
2. removed conditional - replaced equality check with false → KILLED
3. removed conditional - replaced equality check with true → SURVIVED
4. equal to not equal → KILLED

2
6
8

1. Replaced double addition with subtraction → KILLED
2. removed call to java/lang/Number::doubleValue → KILLED
3. Negated double local variable number 2 → KILLED
4. Replaced double operation with first member → KILLED
5. Replaced double operation by second member → KILLED
6. Replaced double addition with subtraction → KILLED
7. Replaced double addition with multiplication → KILLED
8. Replaced double addition with division → KILLED
9. Replaced double addition with modulus → KILLED
10. Incremented (a++) double local variable number 2 → SURVIVED
11. Decremented (a--) double local variable number 2 → SURVIVED
12. Incremented (++a) double local variable number 2 → KILLED
13. Decremented (--a) double local variable number 2 → KILLED

2
7
1

1. Substituted 0.0 with 1.0 → KILLED
2. Substituted 0.0 with 1.0 → KILLED
3. Substituted 0.0 with -1.0 → KILLED
4. Substituted 0.0 with 1.0 → KILLED
5. Substituted 0.0 with -1.0 → KILLED

```
2   1. changed conditional boundary → KILLED
7   2. Substituted 0 with 1 → KILLED
2   3. negated conditional → KILLED
    4. removed call to
    org/jfree/data/KeyedValues::getItemCount → KILLED
    5. removed conditional - replaced comparison check with
    false → KILLED
    6. removed conditional - replaced comparison check with
    true → KILLED
    7. Negated integer local variable number 8 → KILLED
    8. Substituted 0 with 1 → KILLED
    9. Substituted 0 with -1 → KILLED
    10. Substituted 0 with 1 → KILLED
    11. Substituted 0 with -1 → KILLED
    12. Less than to less or equal → KILLED
    13. Less than to greater than → KILLED
    14. Less than to greater or equal → KILLED
    15. Less than to equal → KILLED
    16. Less than to not equal → SURVIVED
    17. Incremented (a++) integer local variable number 8 →
    KILLED
    18. Decremented (a--) integer local variable number 8 →
    KILLED
    19. Incremented (++a) integer local variable number 8 →
    KILLED
    20. Decremented (--a) integer local variable number 8 →
    KILLED

2   1. removed call to org/jfree/data/KeyedValues::getValue →
7   KILLED
3   2. Negated integer local variable number 8 → KILLED
    3. Incremented (a++) integer local variable number 8 →
    KILLED
    4. Decremented (a--) integer local variable number 8 →
    KILLED
    5. Incremented (++a) integer local variable number 8 →
    KILLED
    6. Decremented (--a) integer local variable number 8 →
    KILLED
```

```
274    1. negated conditional → KILLED
       2. removed conditional - replaced equality check with
       false → KILLED
       3. removed conditional - replaced equality check with
       true → SURVIVED
       4. equal to not equal → KILLED

275    1. Replaced double addition with subtraction → KILLED
       2. removed call to java/lang/Number::doubleValue → KILLED
       3. Negated double local variable number 6 → KILLED
       4. Replaced double operation with first member → KILLED
       5. Replaced double operation by second member → KILLED
       6. Replaced double addition with subtraction → KILLED
       7. Replaced double addition with multiplication → KILLED
       8. Replaced double addition with division → KILLED
       9. Replaced double addition with modulus → KILLED
       10. Incremented (a++) double local variable number 6 →
       SURVIVED
       11. Decremented (a--) double local variable number 6 →
       SURVIVED
       12. Incremented (++a) double local variable number 6 →
       KILLED
       13. Decremented (--a) double local variable number 6 →
       KILLED
```

2	1. removed call to java/lang/Double::<init> → KILLED
7	2. Replaced double division with multiplication → KILLED
7	3. removed call to org/jfree/data/KeyedValues::getKey → KILLED
	4. removed call to org/jfree/data/DefaultKeyedValues::addValue → KILLED
	5. Negated integer local variable number 8 → KILLED
	6. Negated double local variable number 6 → KILLED
	7. Negated double local variable number 2 → KILLED
	8. Replaced double operation with first member → KILLED
	9. Replaced double operation by second member → KILLED
	10. Replaced double division with multiplication → KILLED
	11. Replaced double division with modulus → KILLED
	12. Replaced double division with addition → KILLED
	13. Replaced double division with subtraction → KILLED
	14. Incremented (a++) integer local variable number 8 → KILLED
	15. Incremented (a++) double local variable number 6 → KILLED
	16. Incremented (a++) double local variable number 2 → KILLED
	17. Decremented (a--) integer local variable number 8 → TIMED_OUT
	18. Decremented (a--) double local variable number 6 → KILLED
	19. Decremented (a--) double local variable number 2 → KILLED
	20. Incremented (++a) integer local variable number 8 → KILLED
	21. Incremented (++a) double local variable number 6 → KILLED
	22. Incremented (++a) double local variable number 2 → KILLED
	23. Decremented (--a) integer local variable number 8 → KILLED
	24. Decremented (--a) double local variable number 6 → KILLED
	25. Decremented (--a) double local variable number 2 → KILLED

2
7
9
1. replaced return value with null for
org/jfree/data/DataUtilities::getCumulativePercentages →
KILLED
2. mutated return of Object value for
org/jfree/data/DataUtilities::getCumulativePercentages to
(if (x != null) null else throw new RuntimeException) →
KILLED