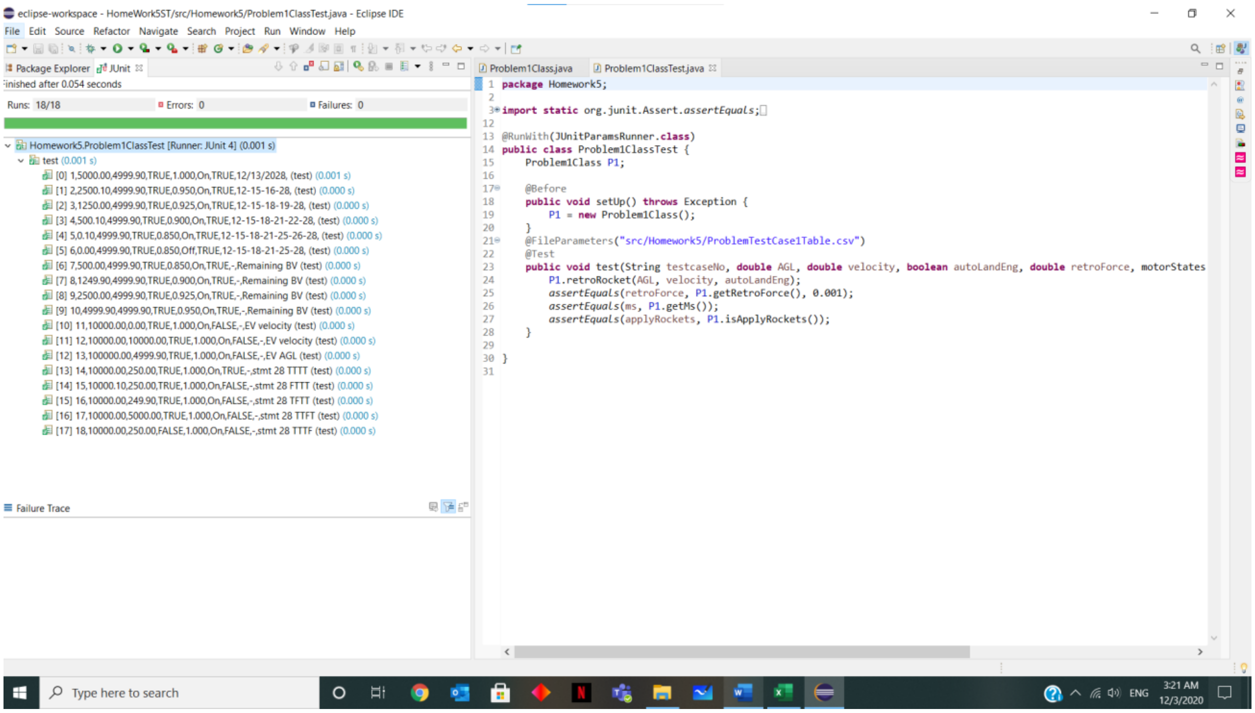
Sum 1 Solution:

TEST CASE NUMBER	Input			Expected Output				
	AGL(FEET)	VELOCITY(MPH)	AUTOLANDING	RETROFORCE	MS	APPLROD	BASISPATH	Comment
1	5,000.0	4,999.9	TRUE	1.000	On	TRUE	12-13-28	
2	2,500.1	4,999.9	TRUE	0.950	On	TRUE	12-15-16-28	
3	1,250.0	4,999.9	TRUE	0.925	On	TRUE	12-15-18-19-28	
4	500.1	4,999.9	TRUE	0.900	On	TRUE	12-15-18-21-22-28	
5	0.1	4,999.9	TRUE	0.850	On	TRUE	12-15-18-21-25-26-28	
6	0.0	4,999.9	TRUE	0.850	Off	TRUE	12-15-18-21-25-28	
7	500.0	4,999.9	TRUE	0.850	On	TRUE	-	Remaining BV
8	1,249.9	4,999.9	TRUE	0.900	On	TRUE	-	Remaining BV
9	2,500.0	4,999.9	TRUE	0.925	On	TRUE	-	Remaining BV
10	4,999.9	4,999.9	TRUE	0.950	On	TRUE	-	Remaining BV
11	10,000.0	0.0	TRUE	1.000	On	FALSE	-	EV velocity
12	10,000.0	10,000.0	TRUE	1.000	On	FALSE	-	EV velocity
13	100,000.0	4,999.9	TRUE	1.000	On	FALSE	-	EV AGL

14	10,000.0	250.0	TRUE	1.000	On	TRUE	-	stmt 28 TTTT
15	10,000.1	250.0	TRUE	1.000	On	FALSE	-	stmt 28 FTTT
16	10,000.0	249.9	TRUE	1.000	On	FALSE	-	stmt 28 TFTT
17	10,000.0	5,000.0	TRUE	1.000	On	FALSE	-	stmt 28 TTFT
18	10,000.0	250.0	FALSE	1.000	On	FALSE	-	stmt 28 TTTF

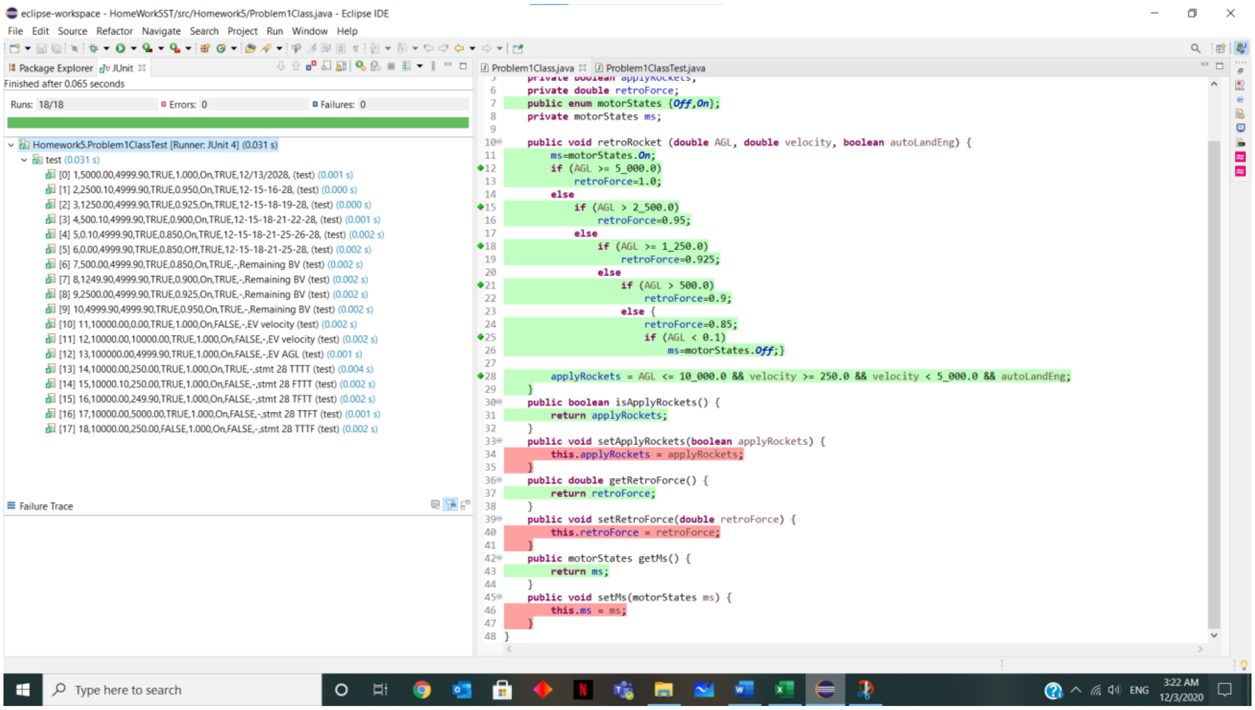
JUnit


eclipse-workspace - HomeWork5ST/src/Homework5/Problem1ClassTest.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Problem1Class.java
Problem1ClassTest.java
Failure Trace
Type here to search
ENG
3:21 AM
12/3/2020

```
Finished after 0.054 seconds
Runs: 18/18    Errors: 0    Failures: 0

Homework5.Problem1ClassTest [Runner: JUnit 4] (0.001 s)
  test (0.001 s)
    [0] 1,5000.00,4999.90,TRUE,1.000,On,TRUE,12/13/2028, (test) (0.001 s)
    [1] 2,2500.10,4999.90,TRUE,0.950,On,TRUE,12-15-16-28, (test) (0.000 s)
    [2] 3,1250.00,4999.90,TRUE,0.925,On,TRUE,12-15-18-19-28, (test) (0.000 s)
    [3] 4,500.10,4999.90,TRUE,0.900,On,TRUE,12-15-18-21-22-28, (test) (0.000 s)
    [4] 5,0.10,4999.90,TRUE,0.850,On,TRUE,12-15-18-21-25-26-28, (test) (0.000 s)
    [5] 6,0.00,4999.90,TRUE,0.850,Off,TRUE,12-15-18-21-25-28, (test) (0.000 s)
    [6] 7,500.00,4999.90,TRUE,0.850,On,TRUE,-,Remaining BV (test) (0.000 s)
    [7] 8,1249.90,4999.90,TRUE,0.900,On,TRUE,-,Remaining BV (test) (0.000 s)
    [8] 9,2500.00,4999.90,TRUE,0.925,On,TRUE,-,Remaining BV (test) (0.000 s)
    [9] 10,4999.90,4999.90,TRUE,0.950,On,TRUE,-,Remaining BV (test) (0.000 s)
    [10] 11,10000.00,0.00,TRUE,1.000,On,FALSE,-,EV velocity (test) (0.000 s)
    [11] 12,10000.00,10000.00,TRUE,1.000,On,FALSE,-,EV velocity (test) (0.000 s)
    [12] 13,100000.00,4999.90,TRUE,1.000,On,FALSE,-,EV AGL (test) (0.000 s)
    [13] 14,10000.00,250.00,TRUE,1.000,On,TRUE,-,stmt 28 TTTT (test) (0.000 s)
    [14] 15,10000.10,250.00,TRUE,1.000,On,FALSE,-,stmt 28 FTTT (test) (0.000 s)
    [15] 16,10000.00,249.90,TRUE,1.000,On,FALSE,-,stmt 28 TFTT (test) (0.000 s)
    [16] 17,10000.00,5000.00,TRUE,1.000,On,FALSE,-,stmt 28 TTFT (test) (0.000 s)
    [17] 18,10000.00,250.00,FALSE,1.000,On,FALSE,-,stmt 28 TTTF (test) (0.000 s)
```

```java
package Homework5;

import static org.junit.Assert.assertEquals;

@RunWith(JUnitParamsRunner.class)
public class Problem1ClassTest {
    Problem1Class P1;

    @Before
    public void setUp() throws Exception {
        P1 = new Problem1Class();
    }
    @FileParameters("src/Homework5/ProblemTestCase1Table.csv")
    @Test
    public void test(String testcaseNo, double AGL, double velocity, boolean autoLandEng, double retroForce, motorStates
        P1.retroRocket(AGL, velocity, autoLandEng);
        assertEquals(retroForce, P1.getRetroForce(), 0.001);
        assertEquals(ms, P1.getMs());
        assertEquals(applyRockets, P1.isApplyRockets());
    }

}
```

JaCoCo


eclipse-workspace - HomeWork5ST/src/Homework5/Problem1Class.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Problem1Class.java
Problem1ClassTest.java
Failure Trace
Type here to search
ENG
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12/3/2020

```
Finished after 0.065 seconds
Runs: 18/18      Errors: 0      Failures: 0

Homework5.Problem1ClassTest [Runner: JUnit 4] (0.031 s)
  test (0.031 s)
    [0] 1,5000.00,4999.90,TRUE,1.000,On,TRUE,12/13/2028, (test) (0.001 s)
    [1] 2,2500.10,4999.90,TRUE,0.950,On,TRUE,12-15-16-28, (test) (0.000 s)
    [2] 3,1250.00,4999.90,TRUE,0.925,On,TRUE,12-15-18-19-28, (test) (0.000 s)
    [3] 4,500.10,4999.90,TRUE,0.900,On,TRUE,12-15-18-21-22-28, (test) (0.001 s)
    [4] 5,0.10,4999.90,TRUE,0.850,On,TRUE,12-15-18-21-25-26-28, (test) (0.002 s)
    [5] 6,0.00,4999.90,TRUE,0.850,Off,TRUE,12-15-18-21-25-28, (test) (0.002 s)
    [6] 7,500.00,4999.90,TRUE,0.850,On,TRUE,-,Remaining BV (test) (0.002 s)
    [7] 8,1249.90,4999.90,TRUE,0.900,On,TRUE,-,Remaining BV (test) (0.002 s)
    [8] 9,2500.00,4999.90,TRUE,0.925,On,TRUE,-,Remaining BV (test) (0.002 s)
    [9] 10,4999.90,4999.90,TRUE,0.950,On,TRUE,-,Remaining BV (test) (0.002 s)
    [10] 11,10000.00,0.00,TRUE,1.000,On,FALSE,-,EV velocity (test) (0.002 s)
    [11] 12,10000.00,10000.00,TRUE,1.000,On,FALSE,-,EV velocity (test) (0.002 s)
    [12] 13,100000.00,4999.90,TRUE,1.000,On,FALSE,-,EV AGL (test) (0.001 s)
    [13] 14,10000.00,250.00,TRUE,1.000,On,TRUE,-,stmt 28 TTTT (test) (0.004 s)
    [14] 15,10000.10,250.00,TRUE,1.000,On,FALSE,-,stmt 28 FTTT (test) (0.002 s)
    [15] 16,10000.00,249.90,TRUE,1.000,On,FALSE,-,stmt 28 TFTT (test) (0.002 s)
    [16] 17,10000.00,5000.00,TRUE,1.000,On,FALSE,-,stmt 28 TTFT (test) (0.001 s)
    [17] 18,10000.00,250.00,FALSE,1.000,On,FALSE,-,stmt 28 TTTF (test) (0.002 s)
```

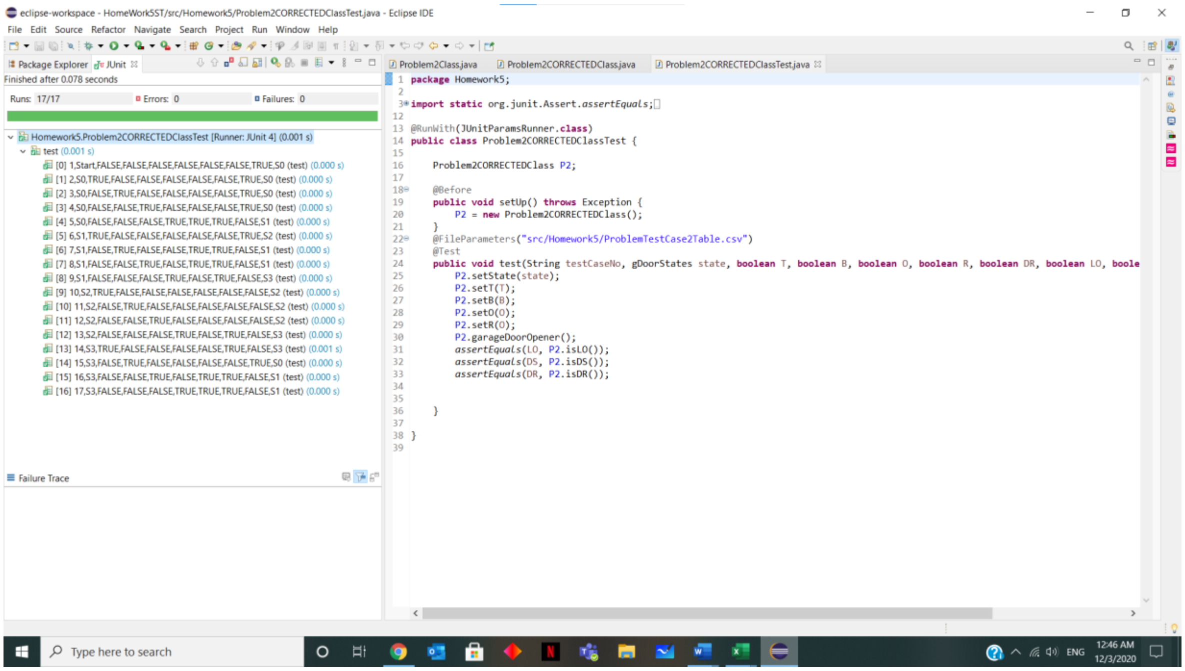
```java
 5      private boolean applyRockets;
 6      private double retroForce;
 7      public enum motorStates {Off,On};
 8      private motorStates ms;
 9  
10      public void retroRocket (double AGL, double velocity, boolean autoLandEng) {
11          ms=motorStates.On;
12          if (AGL >= 5_000.0)
13              retroForce=1.0;
14          else
15              if (AGL > 2_500.0)
16                  retroForce=0.95;
17              else
18                  if (AGL >= 1_250.0)
19                      retroForce=0.925;
20                  else
21                      if (AGL > 500.0)
22                          retroForce=0.9;
23                      else {
24                          retroForce=0.85;
25                          if (AGL < 0.1)
26                              ms=motorStates.Off;}
27  
28          applyRockets = AGL <= 10_000.0 && velocity >= 250.0 && velocity < 5_000.0 && autoLandEng;
29      }
30      public boolean isApplyRockets() {
31          return applyRockets;
32      }
33      public void setApplyRockets(boolean applyRockets) {
34          this.applyRockets = applyRockets;
35      }
36      public double getRetroForce() {
37          return retroForce;
38      }
39      public void setRetroForce(double retroForce) {
40          this.retroForce = retroForce;
41      }
42      public motorStates getMs() {
43          return ms;
44      }
45      public void setMs(motorStates ms) {
46          this.ms = ms;
47      }
48  }
```

Sum 2 Solution:

Test Case Table

Test Case Number	Current State	Inputs				Exp. Outputs			Next State
		T	B	O	R	DR	LO	DS	
1	Start	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	S0
2	S0	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	S0
3	S0	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	S0
4	S0	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE	S0
5	S0	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	S1
6	S1	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	S2
7	S1	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	S1
8	S1	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	S1
9	S1	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE	FALSE	S3
10	S2	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	S2
11	S2	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	S2
12	S2	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	S2
13	S2	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE	FALSE	S3
14	S3	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	S3
15	S3	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	S0
16	S3	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	S1
17	S3	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	S1

JUnit


eclipse-workspace - HomeWork5ST/src/Homework5/Problem2CORRECTEDClassTest.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Problem2Class.java
Problem2CORRECTEDClass.java
Problem2CORRECTEDClassTest.java
Failure Trace
Type here to search
ENG
12:46 AM
12/3/2020

```
Finished after 0.078 seconds
Runs: 17/17    Errors: 0    Failures: 0

Homework5.Problem2CORRECTEDClassTest [Runner: JUnit 4] (0.001 s)
  test (0.001 s)
    [0] 1,Start,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.000 s)
    [1] 2,S0,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.000 s)
    [2] 3,S0,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.000 s)
    [3] 4,S0,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.000 s)
    [4] 5,S0,FALSE,FALSE,FALSE,TRUE,TRUE,TRUE,FALSE,S1 (test) (0.000 s)
    [5] 6,S1,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,TRUE,S2 (test) (0.000 s)
    [6] 7,S1,FALSE,TRUE,FALSE,FALSE,TRUE,TRUE,FALSE,S1 (test) (0.000 s)
    [7] 8,S1,FALSE,FALSE,TRUE,FALSE,TRUE,TRUE,FALSE,S1 (test) (0.000 s)
    [8] 9,S1,FALSE,FALSE,FALSE,TRUE,FALSE,TRUE,FALSE,S3 (test) (0.000 s)
    [9] 10,S2,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,S2 (test) (0.000 s)
    [10] 11,S2,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,S2 (test) (0.000 s)
    [11] 12,S2,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,S2 (test) (0.000 s)
    [12] 13,S2,FALSE,FALSE,FALSE,TRUE,FALSE,TRUE,FALSE,S3 (test) (0.000 s)
    [13] 14,S3,TRUE,FALSE,FALSE,FALSE,FALSE,TRUE,FALSE,S3 (test) (0.001 s)
    [14] 15,S3,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.000 s)
    [15] 16,S3,FALSE,FALSE,TRUE,FALSE,TRUE,TRUE,FALSE,S1 (test) (0.000 s)
    [16] 17,S3,FALSE,FALSE,FALSE,TRUE,TRUE,TRUE,FALSE,S1 (test) (0.000 s)
```

```java
package Homework5;

import static org.junit.Assert.assertEquals;

@RunWith(JUnitParamsRunner.class)
public class Problem2CORRECTEDClassTest {

    Problem2CORRECTEDClass P2;

    @Before
    public void setUp() throws Exception {
        P2 = new Problem2CORRECTEDClass();
    }
    @FileParameters("src/Homework5/ProblemTestCase2Table.csv")
    @Test
    public void test(String testCaseNo, gDoorStates state, boolean T, boolean B, boolean O, boolean R, boolean DR, boolean LO, boole
        P2.setState(state);
        P2.setT(T);
        P2.setB(B);
        P2.setO(O);
        P2.setR(O);
        P2.garageDoorOpener();
        assertEquals(LO, P2.isLO());
        assertEquals(DS, P2.isDS());
        assertEquals(DR, P2.isDR());


    }

}
```

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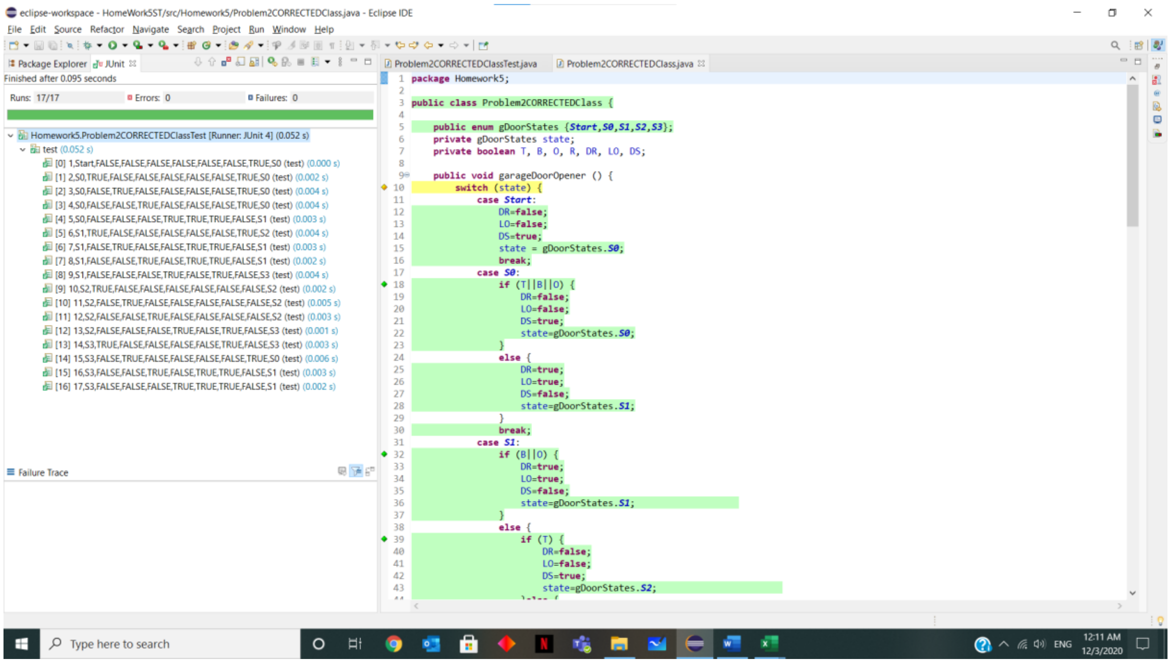
eclipse-workspace - HomeWork5ST/src/Homework5/Problem2CORRECTEDClass.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Problem2CORRECTEDClassTest.java
Problem2CORRECTEDClass.java
Failure Trace
Type here to search
ENG
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12/3/2020

```
Finished after 0.095 seconds
Runs: 17/17    Errors: 0    Failures: 0

Homework5.Problem2CORRECTEDClassTest [Runner: JUnit 4] (0.052 s)
  test (0.052 s)
    [0] 1,Start,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.000 s)
    [1] 2,S0,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.002 s)
    [2] 3,S0,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.004 s)
    [3] 4,S0,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.004 s)
    [4] 5,S0,FALSE,FALSE,FALSE,TRUE,TRUE,TRUE,FALSE,S1 (test) (0.003 s)
    [5] 6,S1,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,TRUE,S2 (test) (0.004 s)
    [6] 7,S1,FALSE,TRUE,FALSE,FALSE,TRUE,TRUE,FALSE,S1 (test) (0.003 s)
    [7] 8,S1,FALSE,FALSE,TRUE,FALSE,TRUE,TRUE,FALSE,S1 (test) (0.002 s)
    [8] 9,S1,FALSE,FALSE,FALSE,TRUE,FALSE,TRUE,FALSE,S3 (test) (0.004 s)
    [9] 10,S2,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,S2 (test) (0.002 s)
    [10] 11,S2,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,S2 (test) (0.005 s)
    [11] 12,S2,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,S2 (test) (0.003 s)
    [12] 13,S2,FALSE,FALSE,FALSE,TRUE,FALSE,TRUE,FALSE,S3 (test) (0.001 s)
    [13] 14,S3,TRUE,FALSE,FALSE,FALSE,FALSE,TRUE,FALSE,S3 (test) (0.003 s)
    [14] 15,S3,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,TRUE,S0 (test) (0.006 s)
    [15] 16,S3,FALSE,FALSE,TRUE,FALSE,TRUE,TRUE,FALSE,S1 (test) (0.003 s)
    [16] 17,S3,FALSE,FALSE,FALSE,TRUE,TRUE,TRUE,FALSE,S1 (test) (0.002 s)
```

```java
package Homework5;

public class Problem2CORRECTEDClass {

    public enum gDoorStates {Start,S0,S1,S2,S3};
    private gDoorStates state;
    private boolean T, B, O, R, DR, LO, DS;

    public void garageDoorOpener () {
        switch (state) {
            case Start:
                DR=false;
                LO=false;
                DS=true;
                state = gDoorStates.S0;
                break;
            case S0:
                if (T||B||O) {
                    DR=false;
                    LO=false;
                    DS=true;
                    state=gDoorStates.S0;
                }
                else {
                    DR=true;
                    LO=true;
                    DS=false;
                    state=gDoorStates.S1;
                }
                break;
            case S1:
                if (B||O) {
                    DR=true;
                    LO=true;
                    DS=false;
                    state=gDoorStates.S1;
                }
                else {
                    if (T) {
                        DR=false;
                        LO=false;
                        DS=true;
                        state=gDoorStates.S2;
```

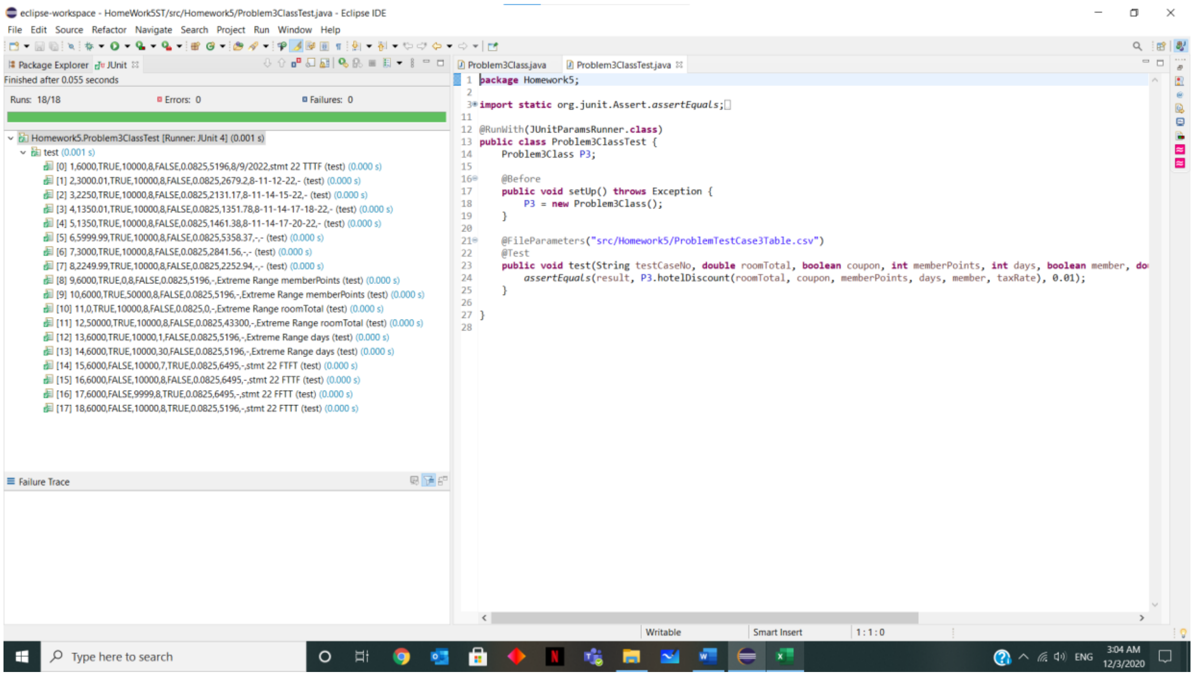
Sum 3 Solution:

Test Case Table:

Test Case Number	Inputs						Exp Out	Basis Path	Comments
	roomTotal	coupon	memberPoints	days	member	taxRate	Result		
1	$6,000.00	TRUE	10,000	8	FALSE	0.0825	$5,196.00	8/9/2022	stmt 22 TTTF
2	$3,000.01	TRUE	10,000	8	FALSE	0.0825	$2,679.20	8-11-12-22	-
3	$2,250.00	TRUE	10,000	8	FALSE	0.0825	$2,131.17	8-11-14-15-22	-
4	$1,350.01	TRUE	10,000	8	FALSE	0.0825	$1,351.78	8-11-14-17-18-22	-
5	$1,350.00	TRUE	10,000	8	FALSE	0.0825	$1,461.38	8-11-14-17-20-22	-
6	$5,999.99	TRUE	10,000	8	FALSE	0.0825	$5,358.37	-	-
7	$3,000.00	TRUE	10,000	8	FALSE	0.0825	$2,841.56	-	-

8	$2,249.99	TRUE	10,000	8	FALSE	0.0825	$2,252.94	-	-
9	$6,000.00	TRUE	0	8	FALSE	0.0825	$5,196.00	-	Extreme Range memberPoints
10	$6,000.00	TRUE	50,000	8	FALSE	0.0825	$5,196.00	-	Extreme Range memberPoints
11	$0.00	TRUE	10,000	8	FALSE	0.0825	$0.00	-	Extreme Range roomTotal
12	$50,000.00	TRUE	10,000	8	FALSE	0.0825	$43,300.00	-	Extreme Range roomTotal
13	$6,000.00	TRUE	10,000	1	FALSE	0.0825	$5,196.00	-	Extreme Range days
14	$6,000.00	TRUE	10,000	30	FALSE	0.0825	$5,196.00	-	Extreme Range days
15	$6,000.00	FALSE	10,000	7	TRUE	0.0825	$6,495.00	-	stmt 22 FTFT
16	$6,000.00	FALSE	10,000	8	FALSE	0.0825	$6,495.00	-	stmt 22 FTTF
17	$6,000.00	FALSE	9,999	8	TRUE	0.0825	$6,495.00	-	stmt 22 FFTT
18	$6,000.00	FALSE	10,000	8	TRUE	0.0825	$5,196.00	-	stmt 22 FTTT

Junit:



eclipse-workspace - HomeWork5ST/src/Homework5/Problem3ClassTest.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Problem3Class.java
Problem3ClassTest.java
Failure Trace
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ENG
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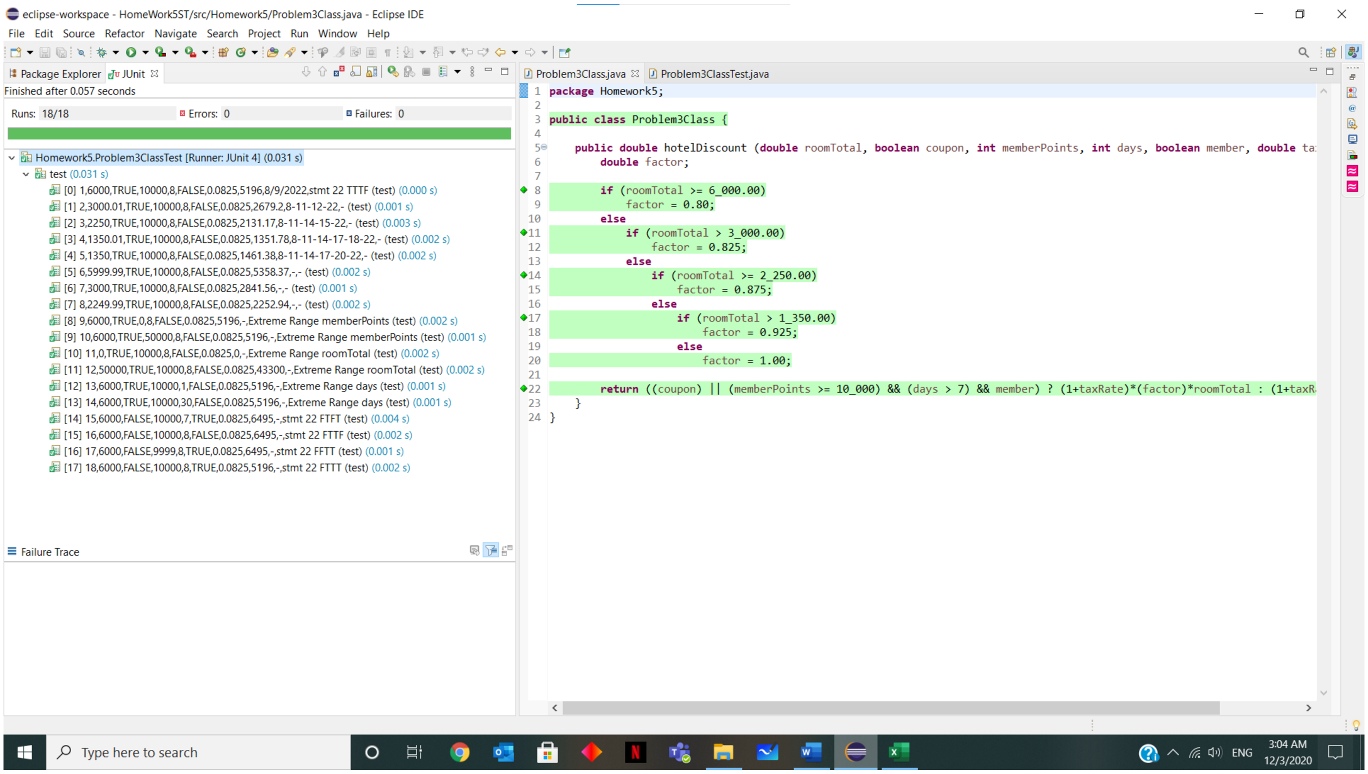
12/3/2020

```
Finished after 0.055 seconds

Runs: 18/18          Errors: 0          Failures: 0

Homework5.Problem3ClassTest [Runner: JUnit 4] (0.001 s)
  test (0.001 s)
    [0] 1,6000,TRUE,10000,8,FALSE,0.0825,5196,8/9/2022,stmt 22 TTTF (test) (0.000 s)
    [1] 2,3000.01,TRUE,10000,8,FALSE,0.0825,2679.2,8-11-12-22,- (test) (0.000 s)
    [2] 3,2250,TRUE,10000,8,FALSE,0.0825,2131.17,8-11-14-15-22,- (test) (0.000 s)
    [3] 4,1350.01,TRUE,10000,8,FALSE,0.0825,1351.78,8-11-14-17-18-22,- (test) (0.000 s)
    [4] 5,1350,TRUE,10000,8,FALSE,0.0825,1461.38,8-11-14-17-20-22,- (test) (0.000 s)
    [5] 6,5999.99,TRUE,10000,8,FALSE,0.0825,5358.37,-,- (test) (0.000 s)
    [6] 7,3000,TRUE,10000,8,FALSE,0.0825,2841.56,-,- (test) (0.000 s)
    [7] 8,2249.99,TRUE,10000,8,FALSE,0.0825,2252.94,-,- (test) (0.000 s)
    [8] 9,6000,TRUE,0,8,FALSE,0.0825,5196,-,Extreme Range memberPoints (test) (0.000 s)
    [9] 10,6000,TRUE,50000,8,FALSE,0.0825,5196,-,Extreme Range memberPoints (test) (0.000 s)
    [10] 11,0,TRUE,10000,8,FALSE,0.0825,0,-,Extreme Range roomTotal (test) (0.000 s)
    [11] 12,50000,TRUE,10000,8,FALSE,0.0825,43300,-,Extreme Range roomTotal (test) (0.000 s)
    [12] 13,6000,TRUE,10000,1,FALSE,0.0825,5196,-,Extreme Range days (test) (0.000 s)
    [13] 14,6000,TRUE,10000,30,FALSE,0.0825,5196,-,Extreme Range days (test) (0.000 s)
    [14] 15,6000,FALSE,10000,7,TRUE,0.0825,6495,-,stmt 22 FTFT (test) (0.000 s)
    [15] 16,6000,FALSE,10000,8,FALSE,0.0825,6495,-,stmt 22 FTTF (test) (0.000 s)
    [16] 17,6000,FALSE,9999,8,TRUE,0.0825,6495,-,stmt 22 FFTT (test) (0.000 s)
    [17] 18,6000,FALSE,10000,8,TRUE,0.0825,5196,-,stmt 22 FTTT (test) (0.000 s)
```

```java
package Homework5;

import static org.junit.Assert.assertEquals;

@RunWith(JUnitParamsRunner.class)
public class Problem3ClassTest {
    Problem3Class P3;

    @Before
    public void setUp() throws Exception {
        P3 = new Problem3Class();
    }

    @FileParameters("src/Homework5/ProblemTestCase3Table.csv")
    @Test
    public void test(String testCaseNo, double roomTotal, boolean coupon, int memberPoints, int days, boolean member, do
        assertEquals(result, P3.hotelDiscount(roomTotal, coupon, memberPoints, days, member, taxRate), 0.01);
    }

}
```

JaCoCo:


eclipse-workspace - HomeWork5ST/src/Homework5/Problem3Class.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Problem3Class.java
Problem3ClassTest.java
Failure Trace
Type here to search
ENG
3:04 AM
12/3/2020

```
Finished after 0.057 seconds
Runs: 18/18        Errors: 0        Failures: 0

Homework5.Problem3ClassTest [Runner: JUnit 4] (0.031 s)
  test (0.031 s)
    [0] 1,6000,TRUE,10000,8,FALSE,0.0825,5196,8/9/2022,stmt 22 TTTF (test) (0.000 s)
    [1] 2,3000.01,TRUE,10000,8,FALSE,0.0825,2679.2,8-11-12-22,- (test) (0.001 s)
    [2] 3,2250,TRUE,10000,8,FALSE,0.0825,2131.17,8-11-14-15-22,- (test) (0.003 s)
    [3] 4,1350.01,TRUE,10000,8,FALSE,0.0825,1351.78,8-11-14-17-18-22,- (test) (0.002 s)
    [4] 5,1350,TRUE,10000,8,FALSE,0.0825,1461.38,8-11-14-17-20-22,- (test) (0.002 s)
    [5] 6,5999.99,TRUE,10000,8,FALSE,0.0825,5358.37,-,- (test) (0.002 s)
    [6] 7,3000,TRUE,10000,8,FALSE,0.0825,2841.56,-,- (test) (0.001 s)
    [7] 8,2249.99,TRUE,10000,8,FALSE,0.0825,2252.94,-,- (test) (0.002 s)
    [8] 9,6000,TRUE,0,8,FALSE,0.0825,5196,-,Extreme Range memberPoints (test) (0.002 s)
    [9] 10,6000,TRUE,50000,8,FALSE,0.0825,5196,-,Extreme Range memberPoints (test) (0.001 s)
    [10] 11,0,TRUE,10000,8,FALSE,0.0825,0,-,Extreme Range roomTotal (test) (0.002 s)
    [11] 12,50000,TRUE,10000,8,FALSE,0.0825,43300,-,Extreme Range roomTotal (test) (0.002 s)
    [12] 13,6000,TRUE,10000,1,FALSE,0.0825,5196,-,Extreme Range days (test) (0.001 s)
    [13] 14,6000,TRUE,10000,30,FALSE,0.0825,5196,-,Extreme Range days (test) (0.001 s)
    [14] 15,6000,FALSE,10000,7,TRUE,0.0825,6495,-,stmt 22 FTFT (test) (0.004 s)
    [15] 16,6000,FALSE,10000,8,FALSE,0.0825,6495,-,stmt 22 FTTF (test) (0.002 s)
    [16] 17,6000,FALSE,9999,8,TRUE,0.0825,6495,-,stmt 22 FFTT (test) (0.001 s)
    [17] 18,6000,FALSE,10000,8,TRUE,0.0825,5196,-,stmt 22 FTTT (test) (0.002 s)
```

```java
 1 package Homework5;
 2 
 3 public class Problem3Class {
 4 
 5     public double hotelDiscount (double roomTotal, boolean coupon, int memberPoints, int days, boolean member, double ta
 6         double factor;
 7 
 8         if (roomTotal >= 6_000.00)
 9             factor = 0.80;
10         else
11             if (roomTotal > 3_000.00)
12                 factor = 0.825;
13             else
14                 if (roomTotal >= 2_250.00)
15                     factor = 0.875;
16                 else
17                     if (roomTotal > 1_350.00)
18                         factor = 0.925;
19                     else
20                         factor = 1.00;
21 
22         return ((coupon) || (memberPoints >= 10_000) && (days > 7) && member) ? (1+taxRate)*(factor)*roomTotal : (1+taxR
23     }
24 }
```

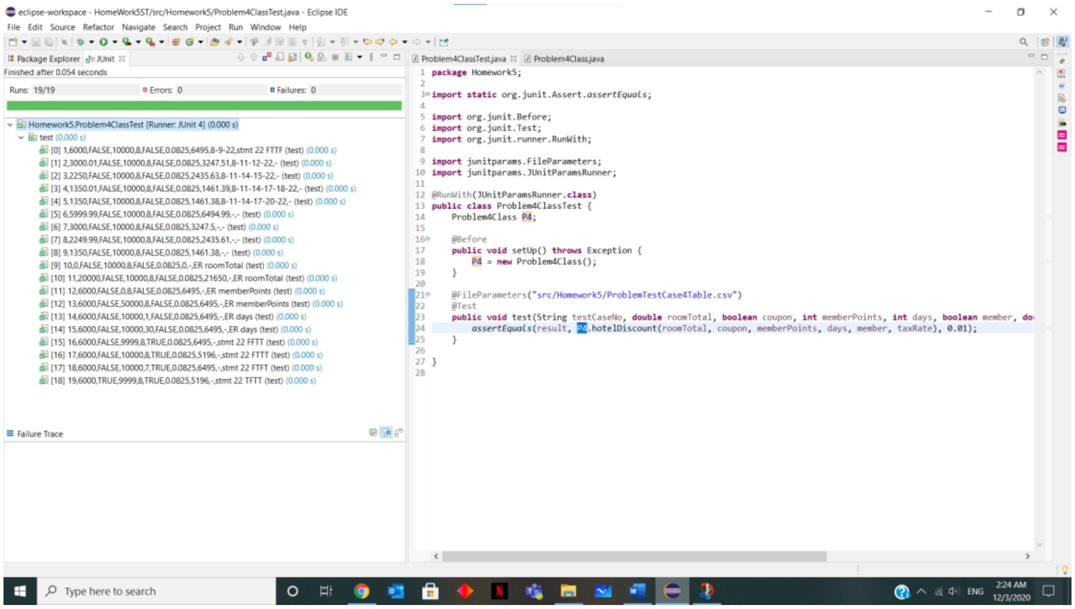
Sum 4 Solution:

Test Case Table:

Test Case Number	Inputs						Exp Out	Basis Path	Comments
	roomTotal	coupon	memberPoints	days	member	taxRate	Result		
1	$6,000.00	FALSE	10,000	8	FALSE	8.25%	$6,495.00	8-9-22	stmt 22 FTTF
2	$3,000.01	FALSE	10,000	8	FALSE	8.25%	$3,247.51	8-11-12-22	-
3	$2,250.00	FALSE	10,000	8	FALSE	8.25%	$2,435.63	8-11-14-15-22	-
4	$1,350.01	FALSE	10,000	8	FALSE	8.25%	$1,461.39	8-11-14-17-18-22	-
5	$1,350.00	FALSE	10,000	8	FALSE	8.25%	$1,461.38	8-11-14-17-20-22	-
6	$5,999.99	FALSE	10,000	8	FALSE	8.25%	$6,494.99	-	-
7	$3,000.00	FALSE	10,000	8	FALSE	8.25%	$3,247.50	-	-
8	$2,249.99	FALSE	10,000	8	FALSE	8.25%	$2,435.61	-	-
9	$1,350.00	FALSE	10,000	8	FALSE	8.25%	$1,461.38	-	-
10	$0.00	FALSE	10,000	8	FALSE	8.25%	$0.00	-	ER roomTotal
11	$20,000.00	FALSE	10,000	8	FALSE	8.25%	$21,650.00	-	ER roomTotal
12	$6,000.00	FALSE	0	8	FALSE	8.25%	$6,495.00	-	ER memberPoints
13	$6,000.00	FALSE	50,000	8	FALSE	8.25%	$6,495.00	-	ER memberPoints
14	$6,000.00	FALSE	10,000	1	FALSE	8.25%	$6,495.00	-	ER days
15	$6,000.00	FALSE	10,000	30	FALSE	8.25%	$6,495.00	-	ER days
16	$6,000.00	FALSE	9,999	8	TRUE	8.25%	$6,495.00	-	stmt 22 FFTT
17	$6,000.00	FALSE	10,000	8	TRUE	8.25%	$5,196.00	-	stmt 22 FTTT

18	$6,000.00	FALSE	10,000	7	TRUE	8.25%	$6,495.00	-	stmt 22 FTFT
19	$6,000.00	TRUE	9,999	8	TRUE	8.25%	$5,196.00	-	stmt 22 TFTT

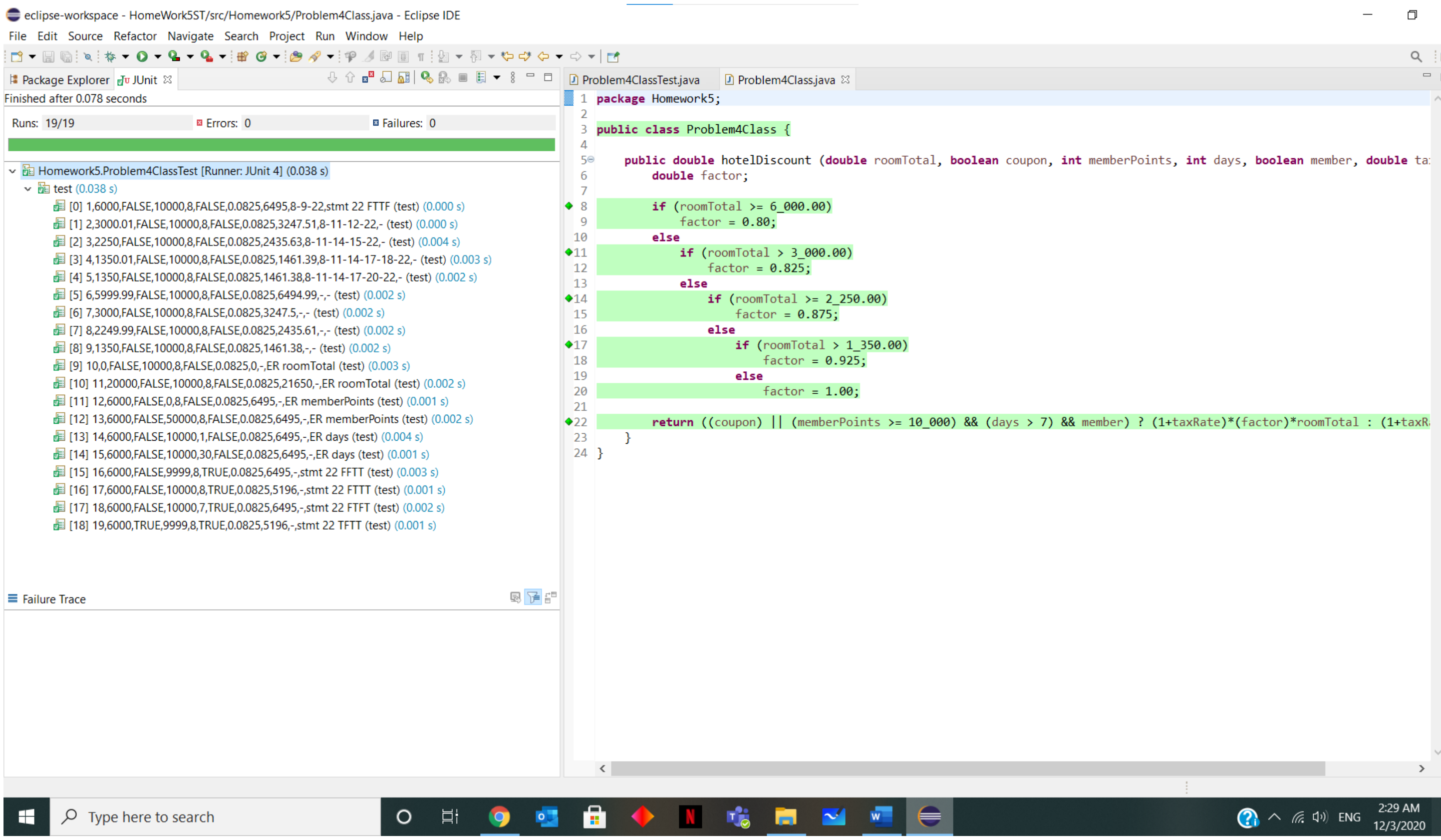
Junit:


eclipse-workspace - HomeWork5ST/src/Homework5/Problem4ClassTest.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Failure Trace
Problem4ClassTest.java
Problem4Class.java
Type here to search
ENG
2:24 AM
12/3/2020

```
Finished after 0.054 seconds
Runs: 19/19    Errors: 0    Failures: 0

Homework5.Problem4ClassTest [Runner: JUnit 4] (0.000 s)
  test (0.000 s)
    [0] 1,6000,FALSE,10000,8,FALSE,0.0825,6495,8-9-22,stmt 22 FTTF (test) (0.000 s)
    [1] 2,3000.01,FALSE,10000,8,FALSE,0.0825,3247.51,8-11-12-22,- (test) (0.000 s)
    [2] 3,2250,FALSE,10000,8,FALSE,0.0825,2435.63,8-11-14-15-22,- (test) (0.000 s)
    [3] 4,1350.01,FALSE,10000,8,FALSE,0.0825,1461.39,8-11-14-17-18-22,- (test) (0.000 s)
    [4] 5,1350,FALSE,10000,8,FALSE,0.0825,1461.38,8-11-14-17-20-22,- (test) (0.000 s)
    [5] 6,5999.99,FALSE,10000,8,FALSE,0.0825,6494.99,-,- (test) (0.000 s)
    [6] 7,3000,FALSE,10000,8,FALSE,0.0825,3247.5,-,- (test) (0.000 s)
    [7] 8,2249.99,FALSE,10000,8,FALSE,0.0825,2435.61,-,- (test) (0.000 s)
    [8] 9,1350,FALSE,10000,8,FALSE,0.0825,1461.38,-,- (test) (0.000 s)
    [9] 10,0,FALSE,10000,8,FALSE,0.0825,0,-,ER roomTotal (test) (0.000 s)
    [10] 11,20000,FALSE,10000,8,FALSE,0.0825,21650,-,ER roomTotal (test) (0.000 s)
    [11] 12,6000,FALSE,0,8,FALSE,0.0825,6495,-,ER memberPoints (test) (0.000 s)
    [12] 13,6000,FALSE,50000,8,FALSE,0.0825,6495,-,ER memberPoints (test) (0.000 s)
    [13] 14,6000,FALSE,10000,1,FALSE,0.0825,6495,-,ER days (test) (0.000 s)
    [14] 15,6000,FALSE,10000,30,FALSE,0.0825,6495,-,ER days (test) (0.000 s)
    [15] 16,6000,FALSE,9999,8,TRUE,0.0825,6495,-,stmt 22 FFTT (test) (0.000 s)
    [16] 17,6000,FALSE,10000,8,TRUE,0.0825,5196,-,stmt 22 FTTT (test) (0.000 s)
    [17] 18,6000,FALSE,10000,7,TRUE,0.0825,6495,-,stmt 22 FTFT (test) (0.000 s)
    [18] 19,6000,TRUE,9999,8,TRUE,0.0825,5196,-,stmt 22 TFTT (test) (0.000 s)
```

```java
package Homework5;

import static org.junit.Assert.assertEquals;

import org.junit.Before;
import org.junit.Test;
import org.junit.runner.RunWith;

import junitparams.FileParameters;
import junitparams.JUnitParamsRunner;

@RunWith(JUnitParamsRunner.class)
public class Problem4ClassTest {
    Problem4Class P4;

    @Before
    public void setUp() throws Exception {
        P4 = new Problem4Class();
    }

    @FileParameters("src/Homework5/ProblemTestCase4Table.csv")
    @Test
    public void test(String testCaseNo, double roomTotal, boolean coupon, int memberPoints, int days, boolean member, do
        assertEquals(result, P4.hotelDiscount(roomTotal, coupon, memberPoints, days, member, taxRate), 0.01);
    }

}
```

JaCoCo:


eclipse-workspace - HomeWork5ST/src/Homework5/Problem4Class.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Problem4ClassTest.java
Problem4Class.java
Failure Trace
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ENG
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12/3/2020

```
Finished after 0.078 seconds

Runs: 19/19        Errors: 0        Failures: 0

Homework5.Problem4ClassTest [Runner: JUnit 4] (0.038 s)
  test (0.038 s)
    [0] 1,6000,FALSE,10000,8,FALSE,0.0825,6495,8-9-22,stmt 22 FTTF (test) (0.000 s)
    [1] 2,3000.01,FALSE,10000,8,FALSE,0.0825,3247.51,8-11-12-22,- (test) (0.000 s)
    [2] 3,2250,FALSE,10000,8,FALSE,0.0825,2435.63,8-11-14-15-22,- (test) (0.004 s)
    [3] 4,1350.01,FALSE,10000,8,FALSE,0.0825,1461.39,8-11-14-17-18-22,- (test) (0.003 s)
    [4] 5,1350,FALSE,10000,8,FALSE,0.0825,1461.38,8-11-14-17-20-22,- (test) (0.002 s)
    [5] 6,5999.99,FALSE,10000,8,FALSE,0.0825,6494.99,-,- (test) (0.002 s)
    [6] 7,3000,FALSE,10000,8,FALSE,0.0825,3247.5,-,- (test) (0.002 s)
    [7] 8,2249.99,FALSE,10000,8,FALSE,0.0825,2435.61,-,- (test) (0.002 s)
    [8] 9,1350,FALSE,10000,8,FALSE,0.0825,1461.38,-,- (test) (0.002 s)
    [9] 10,0,FALSE,10000,8,FALSE,0.0825,0,-,ER roomTotal (test) (0.003 s)
    [10] 11,20000,FALSE,10000,8,FALSE,0.0825,21650,-,ER roomTotal (test) (0.002 s)
    [11] 12,6000,FALSE,0,8,FALSE,0.0825,6495,-,ER memberPoints (test) (0.001 s)
    [12] 13,6000,FALSE,50000,8,FALSE,0.0825,6495,-,ER memberPoints (test) (0.002 s)
    [13] 14,6000,FALSE,10000,1,FALSE,0.0825,6495,-,ER days (test) (0.004 s)
    [14] 15,6000,FALSE,10000,30,FALSE,0.0825,6495,-,ER days (test) (0.001 s)
    [15] 16,6000,FALSE,9999,8,TRUE,0.0825,6495,-,stmt 22 FFTT (test) (0.003 s)
    [16] 17,6000,FALSE,10000,8,TRUE,0.0825,5196,-,stmt 22 FTTT (test) (0.001 s)
    [17] 18,6000,FALSE,10000,7,TRUE,0.0825,6495,-,stmt 22 FTFT (test) (0.002 s)
    [18] 19,6000,TRUE,9999,8,TRUE,0.0825,5196,-,stmt 22 TFTT (test) (0.001 s)
```

```java
 1 package Homework5;
 2 
 3 public class Problem4Class {
 4 
 5     public double hotelDiscount (double roomTotal, boolean coupon, int memberPoints, int days, boolean member, double ta
 6         double factor;
 7 
 8         if (roomTotal >= 6_000.00)
 9             factor = 0.80;
10         else
11             if (roomTotal > 3_000.00)
12                 factor = 0.825;
13             else
14                 if (roomTotal >= 2_250.00)
15                     factor = 0.875;
16                 else
17                     if (roomTotal > 1_350.00)
18                         factor = 0.925;
19                     else
20                         factor = 1.00;
21 
22         return ((coupon) || (memberPoints >= 10_000) && (days > 7) && member) ? (1+taxRate)*(factor)*roomTotal : (1+taxR
23     }
24 }
```

1)PIT is better than JaCoCo because PIT provides us both metrics we want: the Line Coverage metric and the Mutation Coverage metric.

2)To have better test quality:

– Error Seeding

– Quality of Test training, tools, and procedures

– Analysis of test artifacts and personnel

– Mutation testing

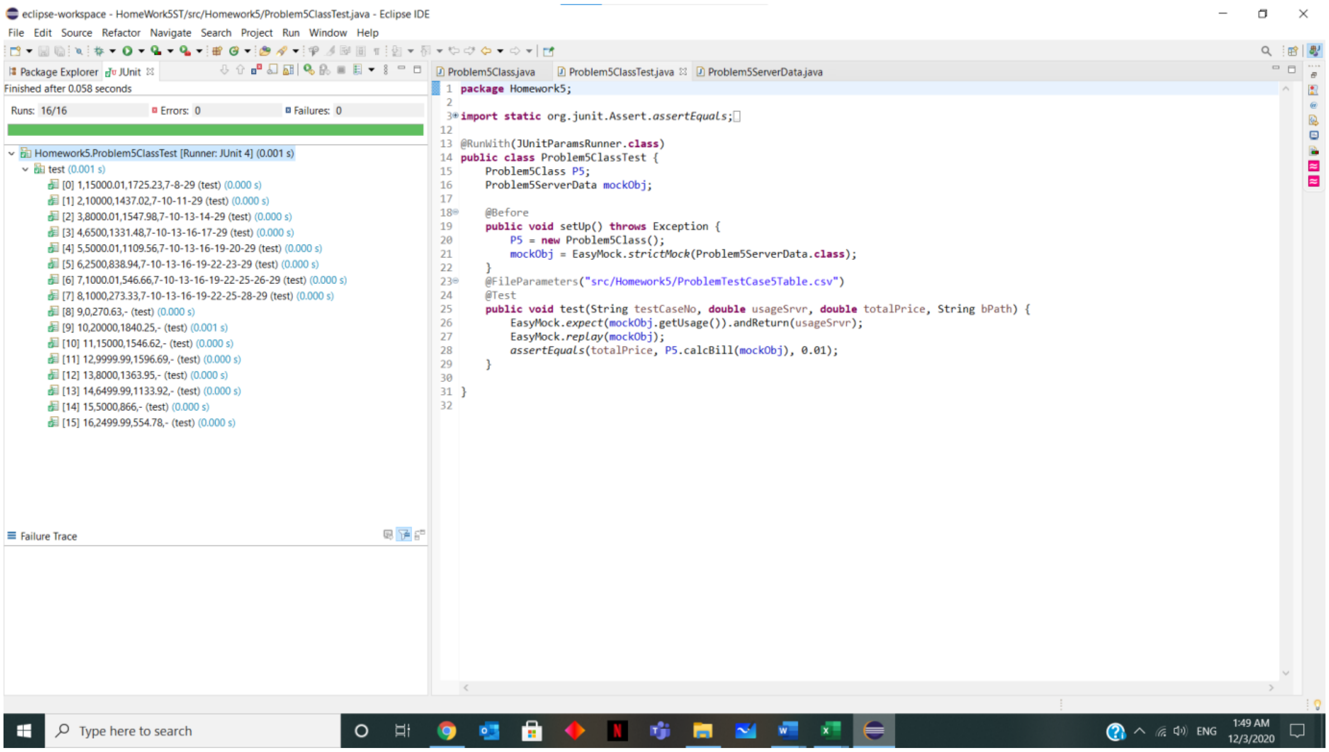
Sum 5 Solution:

Test Case Table

TEST CASE NUMBER	INPUT (MONTH USAGE)	OUTPUT (CHARGES)	BASIS PATH
1	15,000.01	$1,725.23	7-8-29
2	10,000.00	$1,437.02	7-10-11-29
3	8,000.01	$1,547.98	7-10-13-14-29
4	6,500.00	$1,331.48	7-10-13-16-17-29

5	5,000.01	$1,109.56	7-10-13-16-19-20-29
6	2,500.00	$838.94	7-10-13-16-19-22-23-29
7	1,000.01	$546.66	7-10-13-16-19-22-25-26-29
8	1,000.00	$273.33	7-10-13-16-19-22-25-28-29
9	0.00	$270.63	-
10	20,000.00	$1,840.25	-
11	15,000.00	$1,546.62	-
12	9,999.99	$1,596.69	-
13	8,000.00	$1,363.95	-
14	6,499.99	$1,133.92	-
15	5,000.00	$866.00	-
16	2,499.99	$554.78	-

Junit


eclipse-workspace - HomeWork5ST/src/Homework5/Problem5ClassTest.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Problem5Class.java
Problem5ClassTest.java
Problem5ServerData.java
Failure Trace
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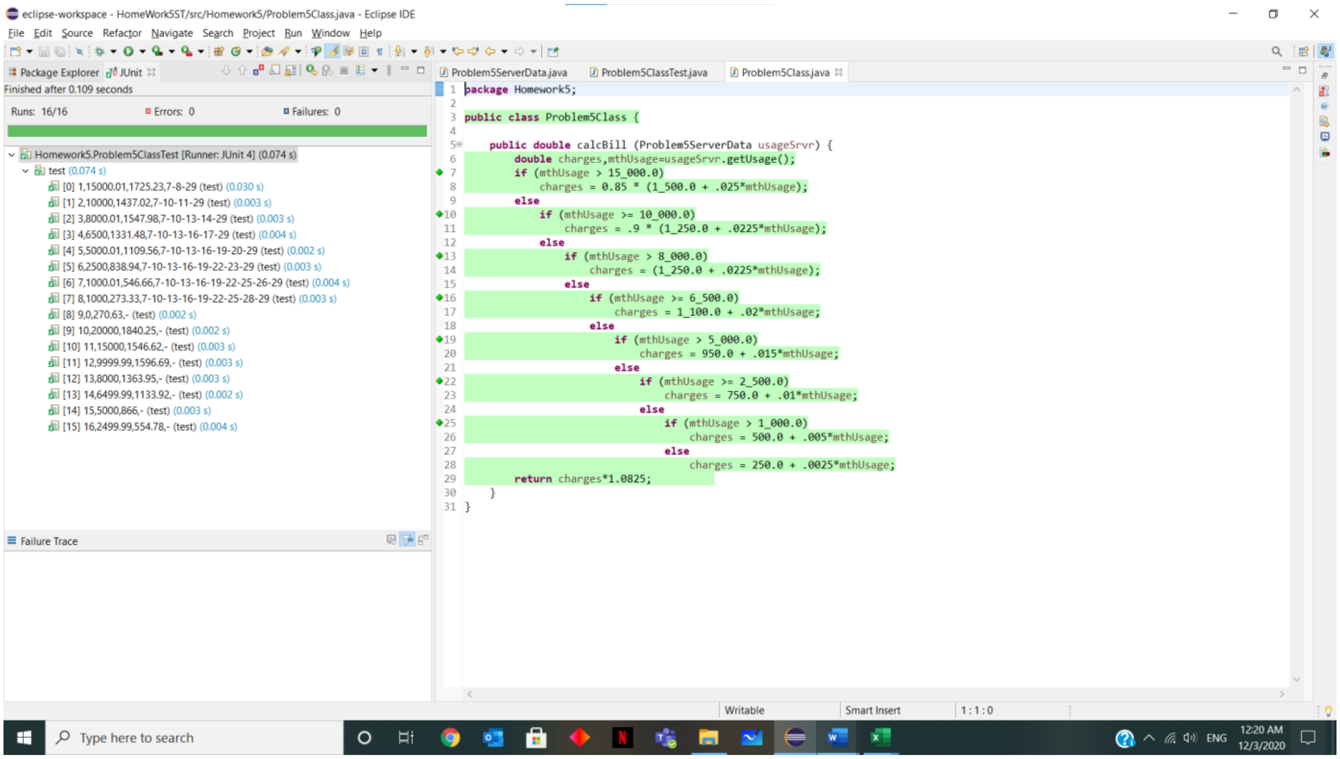
ENG
1:49 AM
12/3/2020

```
Finished after 0.058 seconds

Runs: 16/16        Errors: 0        Failures: 0

Homework5.Problem5ClassTest [Runner: JUnit 4] (0.001 s)
  test (0.001 s)
    [0] 1,15000.01,1725.23,7-8-29 (test) (0.000 s)
    [1] 2,10000,1437.02,7-10-11-29 (test) (0.000 s)
    [2] 3,8000.01,1547.98,7-10-13-14-29 (test) (0.000 s)
    [3] 4,6500,1331.48,7-10-13-16-17-29 (test) (0.000 s)
    [4] 5,5000.01,1109.56,7-10-13-16-19-20-29 (test) (0.000 s)
    [5] 6,2500,838.94,7-10-13-16-19-22-23-29 (test) (0.000 s)
    [6] 7,1000.01,546.66,7-10-13-16-19-22-25-26-29 (test) (0.000 s)
    [7] 8,1000,273.33,7-10-13-16-19-22-25-28-29 (test) (0.000 s)
    [8] 9,0,270.63,- (test) (0.000 s)
    [9] 10,20000,1840.25,- (test) (0.001 s)
    [10] 11,15000,1546.62,- (test) (0.000 s)
    [11] 12,9999.99,1596.69,- (test) (0.000 s)
    [12] 13,8000,1363.95,- (test) (0.000 s)
    [13] 14,6499.99,1133.92,- (test) (0.000 s)
    [14] 15,5000,866,- (test) (0.000 s)
    [15] 16,2499.99,554.78,- (test) (0.000 s)
```

```java
package Homework5;

import static org.junit.Assert.assertEquals;

@RunWith(JUnitParamsRunner.class)
public class Problem5ClassTest {
    Problem5Class P5;
    Problem5ServerData mockObj;

    @Before
    public void setUp() throws Exception {
        P5 = new Problem5Class();
        mockObj = EasyMock.strictMock(Problem5ServerData.class);
    }
    @FileParameters("src/Homework5/ProblemTestCase5Table.csv")
    @Test
    public void test(String testCaseNo, double usageSrvr, double totalPrice, String bPath) {
        EasyMock.expect(mockObj.getUsage()).andReturn(usageSrvr);
        EasyMock.replay(mockObj);
        assertEquals(totalPrice, P5.calcBill(mockObj), 0.01);
    }

}
```

JaCoCo



```
Finished after 0.109 seconds

Runs:  16/16          Errors:  0          Failures:  0

Homework5.Problem5ClassTest [Runner: JUnit 4] (0.074 s)
  test (0.074 s)
    [0] 1,15000.01,1725.23,7-8-29 (test) (0.030 s)
    [1] 2,10000,1437.02,7-10-11-29 (test) (0.003 s)
    [2] 3,8000.01,1547.98,7-10-13-14-29 (test) (0.003 s)
    [3] 4,6500,1331.48,7-10-13-16-17-29 (test) (0.004 s)
    [4] 5,5000.01,1109.56,7-10-13-16-19-20-29 (test) (0.002 s)
    [5] 6,2500,838.94,7-10-13-16-19-22-23-29 (test) (0.003 s)
    [6] 7,1000.01,546.66,7-10-13-16-19-22-25-26-29 (test) (0.004 s)
    [7] 8,1000,273.33,7-10-13-16-19-22-25-28-29 (test) (0.003 s)
    [8] 9,0,270.63,- (test) (0.002 s)
    [9] 10,20000,1840.25,- (test) (0.002 s)
    [10] 11,15000,1546.62,- (test) (0.003 s)
    [11] 12,9999.99,1596.69,- (test) (0.003 s)
    [12] 13,8000,1363.95,- (test) (0.003 s)
    [13] 14,6499.99,1133.92,- (test) (0.002 s)
    [14] 15,5000,866,- (test) (0.003 s)
    [15] 16,2499.99,554.78,- (test) (0.004 s)
```

```java
 1 package Homework5;
 2 
 3 public class Problem5Class {
 4 
 5     public double calcBill (Problem5ServerData usageSrvr) {
 6         double charges,mthUsage=usageSrvr.getUsage();
 7         if (mthUsage > 15_000.0)
 8             charges = 0.85 * (1_500.0 + .025*mthUsage);
 9         else
10             if (mthUsage >= 10_000.0)
11                 charges = .9 * (1_250.0 + .0225*mthUsage);
12             else
13                 if (mthUsage > 8_000.0)
14                     charges = (1_250.0 + .0225*mthUsage);
15                 else
16                     if (mthUsage >= 6_500.0)
17                         charges = 1_100.0 + .02*mthUsage;
18                     else
19                         if (mthUsage > 5_000.0)
20                             charges = 950.0 + .015*mthUsage;
21                         else
22                             if (mthUsage >= 2_500.0)
23                                 charges = 750.0 + .01*mthUsage;
24                             else
25                                 if (mthUsage > 1_000.0)
26                                     charges = 500.0 + .005*mthUsage;
27                                 else
28                                     charges = 250.0 + .0025*mthUsage;
29         return charges*1.0825;
30     }
31 }
```