Answer 1 -

The range here is 0 to 100 inclusive. The volume unit is in gallons.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0.00 25 | 25.01 49.99 | 50.00 75.00 | 75.01 99.99 | 100 |

|  |  |  |
| --- | --- | --- |
|  | **Inputs** | **Expected Output** |
| **Test Case** | **Volume in Tank** | **Status** |
| Case 1 | 0.00 | Empty |
| Case 2 | 25.00 | Empty |
| Case 3 | 25.01 | ¼ Full |
| Case 4 | 49.99 | ¼ Full |
| Case 5 | 50.00 | ½ Full |
| Case 6 | 75.00 | ½ Full |
| Case 7 | 75.01 | ¾ Full |
| Case 8 | 99.99 | ¾ Full |
| Case 9 | 100.00 | Full |

Answer 2 -

The range here for the altitude is 0 to 200 inclusive. The distance is in feet and the velocity is in feet per second. Drone altitude and forward velocity are both doubles with 0.1 significance.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 0.0 0.4 | 0.5 24.9 | 25.0 50.0 | 50.1 74.9 | 75.0 100.0 | 100.1 200.0 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Inputs** | **Expected Output** | |
| **Test Case** | **Altitude** | **Velocity** | **Status of Motor** |
| Case 1 | 0.0 | 0.0 | Off |
| Case 2 | 0.4 | 0.0 | Off |
| Case 3 | 0.5 | 2.5 | Running |
| Case 4 | 24.9 | 2.5 | Running |
| Case 5 | 25.0 | 5.0 | Running |
| Case 6 | 50.0 | 5.0 | Running |
| Case 7 | 50.1 | 10.0 | Running |
| Case 8 | 74.9 | 10.0 | Running |
| Case 9 | 75.0 | 15.0 | Running |
| Case 10 | 100.0 | 15.0 | Running |
| Case 11 | 100.1 | 25.0 | Running |
| Case 12 | 200.0 | 25.0 | Running |

Answer 3 -

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| -⧞ -0.01 | 0.00 | 0.01 799.99 | 800.00 3499.99 | 3500.00 242353.73 | 242353.74 ⧞ |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Inputs** | **Expected Output** | | |
| **Test Case** | **Initial Balance** | **Fee** | **Credit** | **Final Balance** |
| Case 1 | -200.00 | -500 |  | -700.00 |
| Case 2 | -0.01 | -500 |  | -500.01 |
| Case 3 | 0.00 | -150 |  | -150.00 |
| Case 4 | 0.01 |  |  | 0.01 |
| Case 5 | 799.99 |  |  | 812.38 |
| Case 6 | 800.00 |  |  | 818.04 |
| Case 7 | 3499.99 |  |  | 3578.91 |
| Case 8 | 3500.00 |  |  | 3610.42 |
| Case 9 | 242353.73 |  |  | 250000.00 |
| Case 10 | 242353.74 |  | 100 | 250100.01 |
| Case 11 | 290824.48 |  | 100 | 300100.00 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Rule 1** | **Rule 2** | **Rule 3** | **Rule 4** | **Rule 5** | **Rule 6** |
| **Conditions** | | | | | |  |
| -0.01 >= Initial Balance | T |  |  |  |  |  |
| Initial Balance = 0.00 |  | T |  |  |  |  |
| 0.01 >= Initial Balance >= 799.99 |  |  | T |  |  |  |
| 800.00 >= Initial Balance >= 3499.99 |  |  |  | T |  |  |
| 3500 >= Initial Balance >= 242353.73 |  |  |  |  | T |  |
| Initial Balance >= 242353.74 |  |  |  |  |  | T |
| **Actions** | | | | | |  |
| Overdraft Fee | 500 | - | - | - | - | - |
| Credit Amount | - | - | - | - | - | 100 |
| Disuse Fee | - | 150 | - | - | - | - |
| Interest Percent | - | - | 1.55 | 2.255 | 3.155 | 3.155 |

Answer 4 -

a. The number of test cases for this problem comes out to be 9 based on the decision table and we the number of test cases is 9 as well.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Rule 1** | **Rule 2** | **Rule 3** | **Rule 4** | **Rule 5** |
| **Conditions** | | | | | |
| Volume = 100.00 | T |  |  |  |  |
| 99.99 >= Volume >= 75.01 |  | T |  |  |  |
| 75.00 >= Volume >= 50.00 |  |  | T |  |  |
| 49.99 >= Volume >= 25.01 |  |  |  | T |  |
| 25.00 >= Volume >= 0.00 |  |  |  |  | T |
| **Actions** | | | | | |
| Status | Full | 3/4 Full | 1/2 Full | 1/4 Full | Empty |

b. The number of test cases for this problem comes out to be 12 based on the decision table which is equal to the number of test cases defined above.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Rule 1** | **Rule 2** | **Rule 3** | **Rule 4** | **Rule 5** | **Rule 6** |
| **Conditions** | | | | | |  |
| Altitude >= 100.01 | T |  |  |  |  |  |
| 100.00 >= Altitude >= 75.0 |  | T |  |  |  |  |
| 74.9 >= Altitude >= 50.1 |  |  | T |  |  |  |
| 50.0 >= Altitude >= 25.0 |  |  |  | T |  |  |
| 24.9 >= Altitude >= 0.5 |  |  |  |  | T |  |
| 0.4 >= Altitude >= 0.00 |  |  |  |  |  | T |
| **Actions** | | | | | |  |
| Velocity in fps | 25 | 15 | 10 | 5 | 2.5 | 0 |
| Status of motor | On | On | On | On | On | Off |

c. The number of test cases for this problem comes out to be 11 based on the decision table. The actual number of test cases is 11 as well

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Rule 1** | **Rule 2** | **Rule 3** | **Rule 4** | **Rule 5** | **Rule 6** |
| **Conditions** | | | | | | |
| -0.01 >= Initial Balance | T |  |  |  |  |  |
| Initial Balance = 0.00 |  | T |  |  |  |  |
| 0.01 >= Initial Balance >= 799.99 |  |  | T |  |  |  |
| 800.00 >= Initial Balance >= 3499.99 |  |  |  | T |  |  |
| 3500 >= Initial Balance >= 242353.73 |  |  |  |  | T |  |
| Initial Balance >= 242353.74 |  |  |  |  |  | T |
| **Actions** | | | | | |  |
| Overdraft Fee | 500 | - | - | - | - | - |
| Credit Amount | - | - | - | - | - | 100 |
| Disuse Fee | - | 150 | - | - | - | - |
| Interest Percent | - | - | 1.55 | 2.255 | 3.155 | 3.155 |

Answer 5 -

Input table

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **Meaning** | **Type** | **Significance** |
| S | Start button | Boolean | When true leads to Ready state |
| H | Sensor that checks for Gas Pump Nozzle Head removed from its holster. | Boolean | If true it displays the message dispensing |
| F | Checks the status of the Gas Pump Nozzle Flow Handle. | Boolean | If true it starts the flow of gas |
| D | Numeric value truncated to one decimal place | Numeric | Keeps track of the amount of fuel dispensed when the flow handle is pressed |
| T | Represents the stop button | Boolean | If true stops the fuel flow |
| C | Button that resets the gas pump | Boolean | If true resets the system and displays welcome message |

Output Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Label** | **Means** | **Type** | **Significance** |
| D | Numeric value truncated to one decimal place | Numeric | Keeps track of the amount of fuel dispensed when the flow handle is pressed |
| O | Displays the message on the display panel. | String | The different messages we get are “Welcome”, “Ready”, “Dispensing”, “Please pay cashier” based on different states |
| R | Output of the software used to turn on the pump motor which dispenses gas. | Boolean | This keeps on running as long as the cashier does not reset the system. |

Test Table

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Input | | | | | | | **Output** | | | |
| **Test Case** | **Current State** | **S** | **H** | **F** | **T** | **C** | **D** | **D** | **O** | **R** | **New State** |
| Case 1 | Start | F | F | F | F | F | 0 | 0 | Welcome | F | S0 |
| Case 2 | S0 | T | F | F | F | F | 0 | 0 | Ready | F | S1 |
| Case 3 | S0 | F | T | T | T | T | 0 | 0 | Ready | F | S0 |
| Case 4 | S1 | T | T | F | F | F | 0 | 0 | Dispensing | F | S2 |
| Case 5 | S1 | T | F | T | T | T | 0 | 0 | Ready | F | S1 |
| Case 6 | S2 | T | T | T | F | F | 0 | 0 | Dispensing | T | S3 |
| Case 7 | S2 | T | T | F | T | F | 0 | 0 | Pay the cashier | F | S4 |
| Case 8 | S2 | T | F | F | F | F | 0 | 0 | Ready | F | S1 |
| Case 9 | S2 | T | T | F | F | F | 0 | 0 | Dispensing | R | S2 |
| Case 10 | S2 | T | T | F | F | T | 0 | 0 | Dispensing | R | S2 |
| Case 11 | S3 | T | T | F | F | F | Amount of Fuel | Amount of Fuel | Dispensing | T | S2 |
| Case 12 | S3 | T | T | F | T | F | Amount of Fuel | Amount of Fuel | Pay the cashier | T | S4 |
| Case 13 | S3 | T | T | T | T | F | Amount of Fuel | Amount of Fuel | Pay the cashier | T | S4 |
| Case 14 | S3 | T | F | T | T | T | 0 | 0 | Ready | F | S1 |
| Case 15 | S3 | T | T | T | F | F | Amount of Fuel | Amount of Fuel | Dispensing | T | S3 |
| Case 16 | S3 | T | T | T | F | T | Amount of Fuel | Amount of Fuel | Dispensing | T | S3 |
| Case 17 | S4 | T | F | F | F | T | Amount of Fuel | 0 | Welcome | F | S0 |
| Case 18 | S1 | T | T | T | F | F | 0 | 0 | Dispensing | F | S3 |
| Case 19 | S4 | T | T | F | T | F | Amount of Fuel | Amount of Fuel | Pay the cashier | T | S4 |
| Case 20 | S4 | T | T | T | T | F | Amount of Fuel | Amount of Fuel | Pay the cashier | T | S4 |
| Case 21 | S4 | T | T | F | T | T | 0 | 0 | Welcome | F | S0 |
| Case 22 | S4 | T | F | F | T | T | 0 | 0 | Welcome | F | S0 |

State Diagram Below

