1. Equivalence Partitioning

- Valid input: integers in the range 100 to 999.
    - Valid partition: 100 to 999 inclusive.
    - Non-valid partitions: less than 100, more than 999, real (decimal) numbers and non-numeric characters.

- Valid input: names with up to 20 alphabetic characters.
    - Valid partition: strings of up to 20 alphabetic characters.
    - Non-valid partitions: strings of more than 20 alphabetic characters, strings containing non-alphabetic characters.

Exercise 1.1:
Suppose you have a bank account that offers variable interest rates: 0.5 per cent for the first £1,000 credit; 1 percent for the next £1,000; 1.5 per cent for the rest. If you wanted to check that the bank was handling your account correctly what valid input partitions might you use?

Exercise 1.2:
A mail-order company selling flower seeds charges £3.95 for postage and packing on all orders up to £20 value and £4.95 for orders above £20 value and up to £40 value. For orders above £40 value there is no charge for postage and packing.
If you were using equivalence partitioning to prepare test cases for the postage and packing charges what valid partitions would you define?

What about non-valid partitions?

2. Boundary value analysis

- The boiling point of water – the boundary is at 100 degrees Celsius, so for the 3 value boundary approach the boundary values will be 99 degrees, 100 degrees, 101 degrees – unless you have a very accurate digital thermometer, in which case they could be 99.9 degrees, 100.0 degrees, 100.1 degrees. For the 2 value approach the corresponding values would be 100 and 101.
- Exam pass – if an exam has a pass boundary at 40 per cent, merit at 60 per cent and distinction at 80 per cent the 3 value boundaries would be 39, 40, 41 for pass, 59, 60, 61 for merit, 79, 80, 81 for distinction. It is unlikely that marks would be recorded at any greater precision than whole numbers. The 2 value equivalents would be 39 and 40, 59 and 60, and 79 and 80 respectively.

Exercise 2.1:
A system is designed to accept scores from independent markers who have marked the same examination script. Each script should have 5 individual marks, each of which is out of 20, and a total for the script.
Two markers' scores are compared and differences greater than three in any question score or 10 overall are flagged for further examination.

Using equivalence partitioning and boundary value analysis identify the boundary values that you would explore for this scenario.

3. Decision Table Testing

A supermarket has a loyalty scheme that is offered to all customers. Loyalty cardholders enjoy the benefits of either additional discounts on all purchases (rule 3) or the acquisition of loyalty points (rule 4), which can be converted into vouchers for the supermarket or to equivalent points in schemes run by partners. Customers without a loyalty card receive an additional discount only if they spend more than £100 on any one visit to the store (rule 2), otherwise only the special offers offered to all customers apply (rule 1).

	Rule 1	Rule 2	Rule 3	Rule 4
Conditions:				
Customer without loyalty card	T	T	F	F
Customer with loyalty card	F	F	T	T
Extra discount selected	–	–	T	F
Spend > £100	F	T	–	–
Actions:				
No discount	T	F	F	F
Extra discount	F	T	T	F
Loyalty points	F	F	F	T

From the decision table we can determine test cases by setting values for the conditions and determining the expected output, for example from rule 1 we could input a normal customer with a £50 transaction and check that no discount was applied. The same customer with a £150 transaction (rule 2) should attract a discount. Thus we can see that each column of the decision table represents a possible test case.

Exercise 3.1:
A mutual insurance company has decided to float its shares on the stock exchange and is offering its members rewards for their past custom at the time of flotation. Anyone with a current policy will benefit provided it is a 'with-profits' policy and they have held it since 2001. Those who meet these criteria can opt for either a cash payment or an allocation of shares in the new company; those who have held a qualifying policy for less than the required time will be eligible for a cash payment but not for shares. Here is a decision table reflecting those rules.

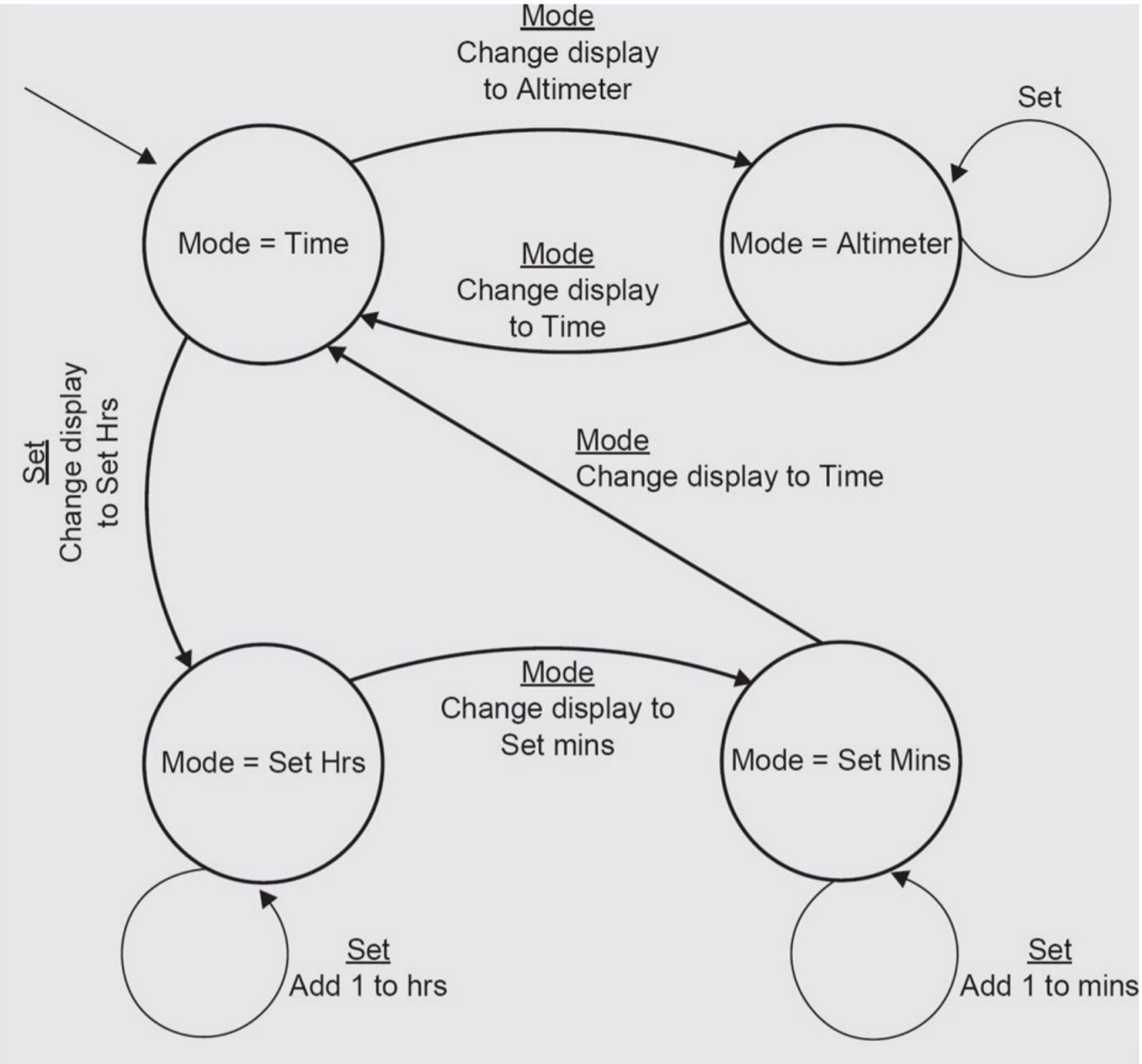
	Rule 1	**Rule 2**	**Rule 3**	**Rule 4**
Conditions:				
Current policy holder	Y	Y	Y	N
Policy holder since 2001	N	Y	N	–
'With-profits' policy	Y	Y	N	–
Actions:				
Eligible for cash payment	Y	Y	N	N
Eligible for share allocations	N	Y	N	N

What expected result would you expect to get for the following test case?
Billy Bunter is a current policy holder who has held a 'with-profits' policy since 2003.

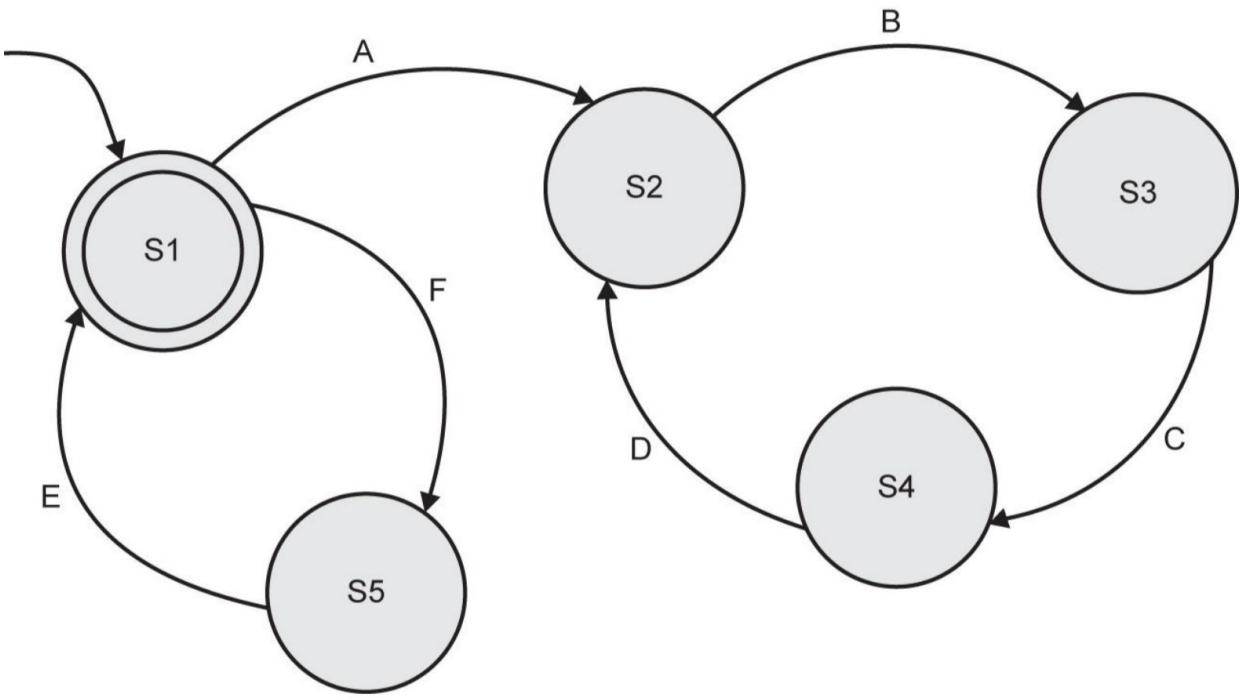
4. State Transition Testing

A hill-walker's watch has two modes: Time and Altimeter. In Time mode, pressing the Mode switch causes the watch to switch to Alt mode; pressing Mode again returns to Time mode. While the watch is in Alt mode the Set button has no effect.
When the watch is in Time mode pressing the Set button transitions the watch into Set Hrs, from which the Hrs display can be incremented by pressing the Set button. If the Mode switch is pressed while the watch is in Set Hrs mode the watch transitions to Set Mins mode, in which pressing the Set button increments the Mins display. If the Mode button is pressed in this mode the watch transitions back to Time mode.
Note that not all events have an effect in all states. Where an event does not have an effect on a given state it is usually omitted, but it can be shown as an arrow starting from the state and

returning to the same state to indicate that no transition takes place; this is sometimes known as a ‘null’ transition or an ‘invalid’ transition.



Exercise 4.1:
In the state transition diagram, which of the sequences of transitions below would be valid?
a. ABCDE
b. FEABC
c. ABCEF
d. EFADC


A
B
S1
S2
S3
F
D
C
E
S4
S5