**Problem 1**

For the information system given below, find the set of all coverings of C and rules describing C in terms of E, F, G. Use RSES method.

Assume that Dom(E) = {e1, e2}, Dom(F) = {f1, f2}, Dom(C) = {c1, c2}.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | **E** | **F** | G | C |
| x1 | **e2** | **f1** | g3 | c2 |
| x2 | **e1** | **f2** | g3 | c1 |
| x3 | **e1** | **f2** | g2 | c1 |
| x4 | **e1** | **f1** | g3 | c2 |
| x5 | **e2** | **f2** | g1 | c2 |
| x6 | **e2** | **f1** | g1 | c2 |

**Problem 2**

Find the set of all representative rules RR(3,75%) for the set of transactions: (B,C,D,E,F), (A,B,C,E,F), (A,B,C,E,H,I), (B,C,D,E,F), (A,C,D,H,I). Take 3 as the threshold for minimal support.

**Problem 3.**

Find the set of all rules in Table S describing C in terms of A, F, G. Use CART (GINI Index) algorithm. Threshold for information gain = 0.2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | A | F | G | C |
| x1 | a2 | f1 | g3 | c2 |
|  x2 | a1 | f2 | g1 | c1 |
| x3 | a1 | f2 | g2 | c1 |
| x4 | a1 | f1 | g1 | c2 |
| x5 | a2 | f2 | g2 | c2 |
| x6 | a1 | f2 | g3 | c2 |

Table S

**Problem 4.**

Find the set of all rules in Table S describing C in terms of A, F, G. Use ID3 (Entropy) algorithm. Threshold for information gain = 0.2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | A | F | G | C |
| x1 | a2 | f1 | g3 | c2 |
|  x2 | a1 | f2 | g1 | c1 |
| x3 | a1 | f2 | g2 | c1 |
| x4 | a1 | f1 | g1 | c2 |
| x5 | a2 | f2 | g2 | c2 |
| x6 | a1 | f2 | g3 | c2 |

Table S

**Problem 5.** Discretize attributes A and B in the Decision Table below. {A, B} are classification attributes. D is the decision attribute.

|  |  |  |  |
| --- | --- | --- | --- |
| X | a | b | d |
| x1 | 1 | 3 | 1 |
| x2 | 5 | 5 | 2 |
| x3 | 5 | 3 | 2 |
| x4 | 3 | 8 | 1 |
| x5 | 8 | 5 | 1 |
| x6 | 8 | 1 | 2 |

**Problem 6.** Find classification rules in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Car | Price | Mileage | Size | Accident | d |
|  1 | \* | {mid} | {full} | \* | good |
| 2 | {low} | \* | {full} | {engine} | good |
| 3 | \* | {high} | {compact} | \* | poor |
| 4 | {high} | {low} | \* | {doors} | good |
| 5 | \* | \* | {full} | {doors} | excel |
| 6 | {low} | {high} | {compact} | \* | poor |

**Problem 7.**

Find optimal reduct in Table T following RSH (RS Heuristic) strategy. Attribute f is the decision attribute.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | a | b | c | d | e | f |
| x1 | 1 | 1 | 0 | 0 | 2 | 1 |
| x2 | 0 | 1 | 0 | 1 | 2 | 0 |
| x3 | 1 | 1 | 0 | 1 | 0 | 0 |
| x4 | 1 | 0 | 1 | 2 | 0 | 0 |
| x5 | 0 | 2 | 1 | 2 | 1 | 1 |
| x6 | 2 | 2 | 1 | 2 | 0 | 1 |
| x7 | 2 | 0 | 1 | 0 | 1 | 1 |

Table T.