Assignment 4

BANA273

Q1

Eggs – 80

Milk -- 40

Sugar – 15

Eggs milk sugar – 10

Eggs, milk – 20

Egg and sugar – 15

Milk, sugar – 10

Egg → milk. support = 0.2 = #(lhs+rhs)/#total = 20/#Total.

Hence #Total = 20/0.2 = 20*5 = 100.

Egg, milk → sugar

Support = #(lhs+rhs)/#total = 10/100 = **0.1**

Confidence = #LHS&RHS/#LHS = 10/20 = **0.5**

Lift = confidence/benchmark confidence.

Benchmark confidence = #RHS/#Total = 15/100

Lift = 0.5 * (100/15) = **3.33**

Q2

Best rules found:

1. income=43759_max 80 ==> save_act=YES 80 conf:(1)
2. age=52_max income=43759_max 76 ==> save_act=YES 76 conf:(1)
3. income=43759_max current_act=YES 63 ==> save_act=YES 63 conf:(1)
4. age=52_max income=43759_max current_act=YES 61 ==> save_act=YES 61 conf:(1)
5. children=0 save_act=YES mortgage=NO pep=NO 74 ==> married=YES 73 conf:(0.99)
6. sex=FEMALE children=0 mortgage=NO pep=NO 64 ==> married=YES 63 conf:(0.98)
7. children=0 current_act=YES mortgage=NO pep=NO 82 ==> married=YES 80 conf:(0.98)
8. children=0 mortgage=NO pep=NO 107 ==> married=YES 104 conf:(0.97)
9. income=43759_max current_act=YES 63 ==> age=52_max 61 conf:(0.97)
10. income=43759_max save_act=YES current_act=YES 63 ==> age=52_max 61 conf:(0.97)
11. income=43759_max current_act=YES 63 ==> age=52_max save_act=YES 61 conf:(0.97)
12. children=0 car=NO mortgage=NO pep=NO 62 ==> married=YES 60 conf:(0.97)
13. age=0_34 married=YES car=NO 69 ==> income=0_24386 66 conf:(0.96)
14. income=43759_max 80 ==> age=52_max 76 conf:(0.95)
15. income=43759_max save_act=YES 80 ==> age=52_max 76 conf:(0.95)
16. income=43759_max 80 ==> age=52_max save_act=YES 76 conf:(0.95)
17. age=0_34 car=NO mortgage=NO 68 ==> income=0_24386 64 conf:(0.94)
18. age=0_34 region=INNER_CITY married=YES 64 ==> income=0_24386 60 conf:(0.94)
19. age=0_34 car=NO save_act=YES 64 ==> income=0_24386 60 conf:(0.94)
20. age=0_34 save_act=YES current_act=YES pep=NO 64 ==> income=0_24386 60 conf:(0.94)
21. age=0_34 car=NO 107 ==> income=0_24386 100 conf:(0.93)
22. age=0_34 car=NO current_act=YES 86 ==> income=0_24386 80 conf:(0.93)

23. age=0_34 current_act=YES mortgage=NO 95 ==> income=0_24386 88 conf:(0.93)

24. age=0_34 married=YES current_act=YES mortgage=NO 67 ==> income=0_24386 62 conf:(0.93)

25. age=0_34 car=NO pep=NO 66 ==> income=0_24386 61 conf:(0.92)

26. age=0_34 married=YES current_act=YES pep=NO 66 ==> income=0_24386 61 conf:(0.92)

27. married=YES children=0 save_act=YES current_act=YES 87 ==> pep=NO 80 conf:(0.92)

28. age=0_34 current_act=YES pep=NO 95 ==> income=0_24386 87 conf:(0.92)

29. age=0_34 save_act=YES pep=NO 82 ==> income=0_24386 75 conf:(0.91)

30. age=0_34 children=0 81 ==> income=0_24386 74 conf:(0.91)

31. married=YES children=0 save_act=YES mortgage=NO 80 ==> pep=NO 73 conf:(0.91)

32. married=YES children=0 current_act=YES mortgage=NO 88 ==> pep=NO 80 conf:(0.91)

33. age=0_34 married=YES current_act=YES 93 ==> income=0_24386 85 conf:(0.91)

34. age=0_34 sex=FEMALE current_act=YES 75 ==> income=0_24386 68 conf:(0.91)

35. age=0_34 save_act=YES current_act=YES 95 ==> income=0_24386 86 conf:(0.91)

36. age=0_34 mortgage=NO 125 ==> income=0_24386 113 conf:(0.9)

37. age=0_34 current_act=YES 153 ==> income=0_24386 138 conf:(0.9)

38. age=0_34 sex=MALE 102 ==> income=0_24386 92 conf:(0.9)

39. age=0_34 save_act=YES mortgage=NO 80 ==> income=0_24386 72 conf:(0.9)

40. age=0_34 mortgage=NO pep=NO 80 ==> income=0_24386 72 conf:(0.9)

41. sex=FEMALE married=YES children=0 mortgage=NO 70 ==> pep=NO 63 conf:(0.9)

42. married=YES children=0 save_act=YES 119 ==> pep=NO 107 conf:(0.9)

43. age=0_34 married=YES mortgage=NO 89 ==> income=0_24386 80 conf:(0.9)

44. age=0_34 married=YES pep=NO 88 ==> income=0_24386 79 conf:(0.9)

45. age=0_34 sex=MALE current_act=YES 78 ==> income=0_24386 70 conf:(0.9)

46. age=0_34 region=INNER_CITY 97 ==> income=0_24386 87 conf:(0.9)

47. married=YES children=0 mortgage=NO 116 ==> pep=NO 104 conf:(0.9)

48. age=0_34 married=NO 67 ==> income=0_24386 60 conf:(0.9)

49. married=YES children=0 car=NO mortgage=NO 67 ==> pep=NO 60 conf:(0.9)

50. age=0_34 pep=NO 124 ==> income=0_24386 111 conf:(0.9)

51. age=0_34 save_act=NO 76 ==> income=0_24386 68 conf:(0.89)

52. age=0_34 region=INNER_CITY current_act=YES 76 ==> income=0_24386 68 conf:(0.89)

53. age=0_34 195 ==> income=0_24386 174 conf:(0.89)

54. age=0_34 save_act=YES 119 ==> income=0_24386 106 conf:(0.89)

55. age=0_34 married=YES 128 ==> income=0_24386 114 conf:(0.89)

56. age=0_34 pep=YES 71 ==> income=0_24386 63 conf:(0.89)

57. age=0_34 married=YES save_act=YES 77 ==> income=0_24386 68 conf:(0.88)

58. age=52_max married=YES car=YES 68 ==> save_act=YES 60 conf:(0.88)

59. age=0_34 sex=FEMALE 93 ==> income=0_24386 82 conf:(0.88)

60. children=0 car=NO pep=NO 91 ==> married=YES 80 conf:(0.88)

61. region=INNER_CITY children=0 pep=NO 73 ==> married=YES 64 conf:(0.88)

62. age=0_34 mortgage=YES 70 ==> income=0_24386 61 conf:(0.87)

63. children=0 car=NO current_act=YES pep=NO 69 ==> married=YES 60 conf:(0.87)

64. sex=FEMALE children=0 pep=NO 90 ==> married=YES 78 conf:(0.87)

65. car=NO mortgage=NO pep=YES 89 ==> current_act=YES 77 conf:(0.87)

66. children=1 save_act=YES current_act=YES 73 ==> pep=YES 63 conf:(0.86)

67. sex=FEMALE children=0 current_act=YES pep=NO 70 ==> married=YES 60 conf:(0.86)

68. car=YES save_act=YES mortgage=NO pep=NO 74 ==> married=YES 63 conf:(0.85)

69. region=INNER_CITY current_act=YES mortgage=NO pep=NO 78 ==> married=YES 66 conf:(0.85)

70. children=1 mortgage=NO 84 ==> pep=YES 71 conf:(0.85)

71. save_act=YES mortgage=NO pep=NO 142 ==> married=YES 120 conf:(0.85)

72. income=0_24386 children=0 pep=NO 71 ==> married=YES 60 conf:(0.85)

73. sex=FEMALE married=YES children=0 current_act=YES 71 ==> pep=NO 60 conf:(0.85)

74. children=0 pep=NO 167 ==> married=YES 141 conf:(0.84)

75. age=52_max pep=NO 83 ==> save_act=YES 70 conf:(0.84)

76. save_act=YES current_act=YES mortgage=NO pep=NO 108 ==> married=YES 91 conf:(0.84)

77. children=1 save_act=YES 95 ==> pep=YES 80 conf:(0.84)

78. children=0 car=YES pep=NO 76 ==> save_act=YES 64 conf:(0.84)

79. age=0_34 car=YES 88 ==> income=0_24386 74 conf:(0.84)

80. age=52_max sex=MALE 80 ==> save_act=YES 67 conf:(0.84)

81. region=INNER_CITY children=0 pep=NO 73 ==> current_act=YES 61 conf:(0.84)

82. region=INNER_CITY mortgage=NO pep=NO 96 ==> married=YES 80 conf:(0.83)

83. married=NO car=NO save_act=YES 72 ==> current_act=YES 60 conf:(0.83)

84. children=1 current_act=YES 101 ==> pep=YES 84 conf:(0.83)

85. married=YES children=1 89 ==> pep=YES 74 conf:(0.83)

86. sex=FEMALE region=INNER_CITY pep=NO 77 ==> current_act=YES 64 conf:(0.83)

87. married=NO save_act=YES pep=YES 77 ==> current_act=YES 64 conf:(0.83)

88. married=NO save_act=YES pep=YES 77 ==> mortgage=NO 64 conf:(0.83)

89. sex=FEMALE save_act=YES mortgage=NO pep=NO 77 ==> married=YES 64 conf:(0.83)

90. sex=FEMALE married=YES children=0 94 ==> pep=NO 78 conf:(0.83)

91. sex=MALE mortgage=NO pep=NO 94 ==> married=YES 78 conf:(0.83)

92. age=0_34 sex=FEMALE income=0_24386 82 ==> current_act=YES 68 conf:(0.83)

93. income=24387_43758 mortgage=NO pep=NO 76 ==> married=YES 63 conf:(0.83)

94. age=52_max married=YES 128 ==> save_act=YES 106 conf:(0.83)

95. children=0 current_act=YES pep=NO 127 ==> married=YES 105 conf:(0.83)

96. sex=FEMALE region=INNER_CITY save_act=YES 86 ==> current_act=YES 71 conf:(0.83)

97. current_act=YES mortgage=YES pep=NO 86 ==> save_act=YES 71 conf:(0.83)

98. region=INNER_CITY married=YES mortgage=NO pep=NO 80 ==> current_act=YES 66 conf:(0.83)

99. married=NO save_act=YES 137 ==> current_act=YES 113 conf:(0.82)

100. region=INNER_CITY children=0 save_act=YES 74 ==> current_act=YES 61 conf:(0.82)

1) Rules where RHS is PEP=YES

66. children=1 save_act=YES current_act=YES 73 ==> pep=YES 63 conf:(0.86)
70. children=1 mortgage=NO 84 ==> pep=YES 71 conf:(0.85)
77. children=1 save_act=YES 95 ==> pep=YES 80 conf:(0.84)
84. children=1 current_act=YES 101 ==> pep=YES 84 conf:(0.83)
85. married=YES children=1 89 ==> pep=YES 74 conf:(0.83)

The types of customers that are likely to buy the personal equity plan are indicated on the LHS of each rule. So for example, rule 66 tells us that customers with 1 child, and a savings account and a current account are likely to buy pep.

Rules where RHS = pep=NO

27. married=YES children=0 save_act=YES current_act=YES 87 ==> pep=NO 80 conf:(0.92)

31. married=YES children=0 save_act=YES mortgage=NO 80 ==> pep=NO 73 conf:(0.91)

32. married=YES children=0 current_act=YES mortgage=NO 88 ==> pep=NO 80 conf:(0.91)

41. sex=FEMALE married=YES children=0 mortgage=NO 70 ==> pep=NO 63 conf:(0.9)

42. married=YES children=0 save_act=YES 119 ==> pep=NO 107 conf:(0.9)

47. married=YES children=0 mortgage=NO 116 ==> pep=NO 104 conf:(0.9)

49. married=YES children=0 car=NO mortgage=NO 67 ==> pep=NO 60 conf:(0.9)

These rules can be similarly used to identify customer types who are not likely to buy the personal equity plan.

2) Identify 2 rules and explain why they are interesting. This is an open-ended question. You can pick any 2 rules as long as they can explain what are the implications of the rule and how it can be useful.