Question 1.

The number of frequent itemsets is 20.

support	itemsets
0.48	(gpa_3.2_3.6)
0.44	(status_junior)
0.36	(age_16...20)
0.32	(age_26...30)
0.28	(gpa_3.6_4.0)
0.28	(major_philosophy)
0.24	(major_French)
0.24	(age_16...20, status_junior)
0.24	(gpa_2.8_3.2)
0.2	(status_Ph.D)
0.2	(major_philosophy, age_26...30)
0.2	(gpa_3.2_3.6, status_junior)
0.2	(age_16...20, gpa_3.2_3.6)
0.16	(age_over 30)
0.16	(age_21...25)
0.16	(status_senior)
0.16	(status_Ph.D, age_26...30)
0.16	(status_M.S)
0.16	(status_junior, age_21...25)
0.16	(gpa_3.2_3.6, age_26...30)

When the confidence is 0.9, only one rule are produced.

antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
(age_21...25)	(status_junior)	0.16	0.44	0.16	1.0	2.272727272727270	0.0896	inf

When the confidence is 0.7, having three rules are produced.

antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
(major_philosophy)	(age_26...30)	0.28	0.32	0.2	0.7142857142857140	2.232142857142860	0.1104	2.38
(status_Ph.D)	(age_26...30)	0.2	0.32	0.16	0.8000000000000000	2.5000000000000000	0.096	3.4000000000000000

(age_21...25)	(status_junior)	0.16	0.44	0.16	1.0	2.27272727272 7270	0.089 6	inf

Question 2

The number of frequent itemsets is 231

Here are just a few random samples because there are too many frequent itemsets, space does not permit me to list them all.

support	itemsets
0.6633333333333330	frozenset({'children_(-0.003, 1.0]'})
0.6516666666666670	frozenset({'mortgage_NO'})
0.5066666666666670	frozenset({'car_NO'})
0.5	frozenset({'sex_FEMALE'})
0.475	frozenset({'income_(4956.094, 24386.173]'})
0.45666666666666700	frozenset({'pep_YES'})
0.21833333333333300	frozenset({'children_(-0.003, 1.0]', 'car_NO', 'mortgage_NO'})
0.2633333333333330	frozenset({'car_NO', 'current_act_YES', 'mortgage_NO'})
0.22166666666666700	frozenset({'married_YES', 'car_NO', 'mortgage_NO'})
0.215	frozenset({'save_act_YES', 'car_NO', 'mortgage_NO'})
0.25166666666666700	frozenset({'married_YES', 'car_NO', 'current_act_YES'})
0.23333333333333300	frozenset({'children_(-0.003, 1.0]', 'married_YES', 'car_NO'})
0.22166666666666700	frozenset({'save_act_YES', 'married_YES', 'car_NO'})
0.21	frozenset({'married_YES', 'car_NO', 'pep_NO'})
0.205	frozenset({'income_(4956.094, 24386.173]', 'car_YES'})
0.24833333333333300	frozenset({'sex_MALE', 'income_(4956.094, 24386.173]'})
0.23833333333333300	frozenset({'income_(4956.094, 24386.173]', 'children_(-0.003, 1.0]', 'current_act_YES'})
0.215	frozenset({'married_YES', 'current_act_YES', 'mortgage_NO', 'pep_NO'})
0.2	frozenset({'save_act_YES', 'married_YES', 'mortgage_NO', 'pep_NO'})
0.26666666666666700	frozenset({'save_act_YES', 'car_YES', 'current_act_YES'})
0.23833333333333300	frozenset({'car_YES', 'current_act_YES', 'mortgage_NO'})
0.20833333333333300	frozenset({'children_(-0.003, 1.0]', 'age_(17.951, 34.333]'})
0.23	frozenset({'income_(4956.094, 24386.173]', 'current_act_YES', 'age_(17.951, 34.333]'})

Setting the confidence value is 0.78, then generating 17 rules.

antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
frozenset({'save_act_YES', 'children_(-0.00	frozenset({'current_act_YES'})	0.27833333 33333330	0.7583333 333333330	0.22333333 333333300	0.8023952 095808380	1.0581035 73073630	0.012263888 888888900	1.2229797 97979800

3, 1.0]', 'mortgage_NO'}								
frozenset({'save_act_YES', 'mortgage_NO'})	frozenset({'current_act_YES'})	0.45	0.7583333333333330	0.3533333333333300	0.7851851851851850	1.0354090354090400	0.0120833333333300	1.1250000000000000
frozenset({'car_NO', 'mortgage_NO'})	frozenset({'current_act_YES'})	0.3283333333333330	0.7583333333333330	0.2633333333333330	0.8020304568527920	1.0576225 8046522	0.0143472222222222200	1.2207264957265000
frozenset({'car_NO', 'sex_FEMALE'})	frozenset({'current_act_YES'})	0.255	0.7583333333333330	0.2	0.7843137254901960	1.0342598577892700	0.0066250000000000002	1.1204545454545500
frozenset({'pep_YES', 'mortgage_NO'})	frozenset({'current_act_YES'})	0.3033333333333300	0.7583333333333330	0.2383333333333300	0.7857142857142860	1.0361067503924600	0.0083055555555555570	1.1277777777777800
frozenset({'save_act_YES', 'pep_YES'})	frozenset({'current_act_YES'})	0.2983333333333300	0.7583333333333330	0.2333333333333300	0.7821229050279330	1.0313708637731000	0.0070972222222222230	1.1091880 34188030
frozenset({'save_act_YES', 'region_INNER_CITY'})	frozenset({'current_act_YES'})	0.2883333333333300	0.7583333333333330	0.2266666666666700	0.7861271676300580	1.0366512100616100	0.0080138888888888880	1.1299549549549500
frozenset({'married_NO'})	frozenset({'current_act_YES'})	0.34	0.7583333333333330	0.27	0.7941176470588240	1.0471881060116400	0.0121666666666666700	1.1738095238095200
frozenset({'pep_NO', 'mortgage_NO'})	frozenset({'married_YES'})	0.3483333333333300	0.66	0.285	0.8181818181818180	1.2396694214876000	0.0551000000000000000	1.8700000000000000
frozenset({'pep_NO', 'current_act_YES', 'mortgage_NO'})	frozenset({'married_YES'})	0.2633333333333330	0.66	0.215	0.8164556962025320	1.2370540851553500	0.0412000000000000000	1.8524137931034500
frozenset({'save_act_YES', 'pep_NO', 'mortgage_NO'})	frozenset({'married_YES'})	0.2366666666666700	0.66	0.2	0.8450704225352110	1.2804097311139600	0.0438000000000000000	2.1945454545454600
frozenset({'pep_NO', 'children_(-0.003, 1.0]'})	frozenset({'married_YES'})	0.32	0.66	0.26	0.8125	1.2310606 06060610	0.0488000000000000000	1.8133333333333300
frozenset({'age_(50.667, 67.0]'})	frozenset({'save_act_YES'})	0.3183333333333300	0.69	0.2516666666666700	0.7905759162303660	1.1457621974353100	0.0320166666666666660	1.4802500000000000
frozenset({'age_(17.951, 34.333]'})	frozenset({'income_(4956.094, 24386.173]'})	0.325	0.475	0.29	0.8923076923076920	1.8785425101214600	0.135625	4.8750000 00000000
frozenset({'age_(17.951, 34.333]'})	frozenset({'current_act_YES'})	0.325	0.7583333333333330	0.255	0.7846153846153850	1.0346576500422700	0.0085416666666666667	1.1220238095238100

frozenset({'income_(4956.094, 24386.173]', 'age_(17.951, 34.333]'})	frozenset({'current_act_YES'})	0.29	0.7583333333333330	0.23	0.7931034482758620	1.045850701023120	0.010083333333333340	1.1680555555555600
frozenset({'current_act_YES', 'age_(17.951, 34.333]'})	frozenset({'income_(4956.094, 24386.173]'})	0.255	0.475	0.23	0.9019607843137260	1.8988648090815300	0.10887500000000000	5.3550000000000000

I select the two rules to analyse:

frozenset({'age_(17.951, 34.333]', 'current_act_YES'})	frozenset({'income_(4956.094, 24386.173]'})	0.255	0.475	0.23	0.9019607843137260	1.8988648090815300	0.10887500000000000	5.3550000000000000

For users between the ages of 17-34, and they have a deposit account, their income may be higher. The company can recommend some high-end products or investment wealth management products to this group of people.

frozenset({'age_(50.667, 67.0]'})	frozenset({'save_act_YES'})	0.3183333333333300	0.69	0.2516666666666700	0.7905759162303660	1.1457621974353100	0.0320166666666660	1.4802500000000000

For users between the ages of 50-67, they may have retired and have some money, so they may have a deposit account. For companies, companies could recommend some investment and wealth management products like them.