

1.

Age	Graduated	Income	Gender	Smokes?
18	No	12K	M	Yes
22	Yes	32K	F	Yes
27	No	59K	M	Yes
10	No	0K	F	No
29	Yes	65K	F	No
45	No	47K	F	No
59	Yes	75K	M	No
37	Yes	72K	M	Yes
31	No	32K	M	No
65	No	87K	M	Yes
56	Yes	54K	F	No
14	No	0K	M	Yes
39	Yes	20K	F	Yes

a) Generate a decision tree using **Gain Ratio** for attribute selection.

b) Generate a decision tree using **Gini Index** for attribute selection.

(Show all calculations of gains for every attribute at every node. Just drawing the tree will not be sufficient. In case of tie, prioritize the attributes in left to right order shown in the table above.)

2. For the following transactions and $min_support = 3$, generate (a) **FP-tree** and (b) **d-conditional FP-tree**. Break ties in frequencies by alphabetical ordering, e.g. if c and f both have frequencies 4, c should be ahead of f.

TID	Items bought
100	{f, a, c, d, h, i, m, p}
200	{a, b, c, f, d, m, o}
300	{b, f, h, j, o, w}
400	{b, c, h, d, p}
500	{a, f, c, h, l, p, m, n}