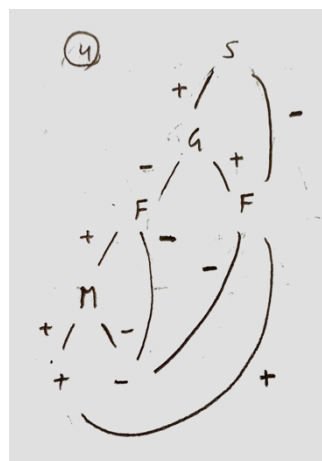
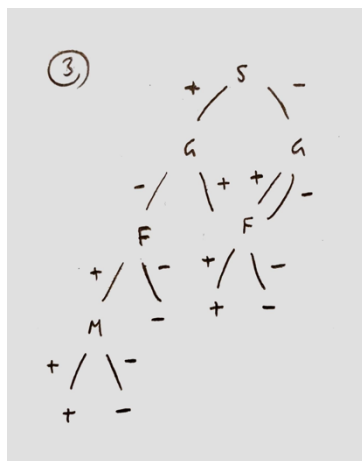
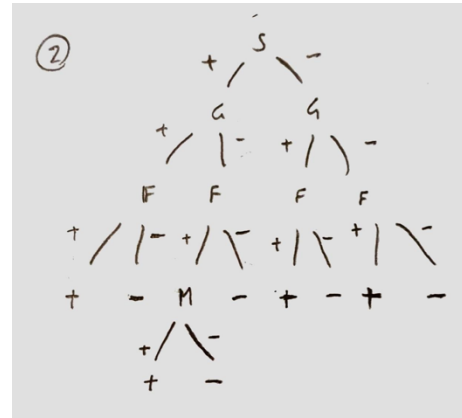
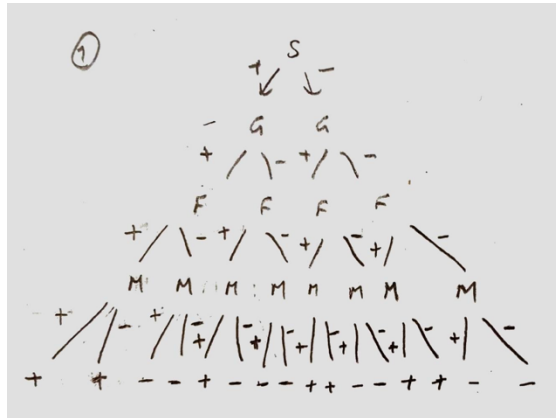


HW 8

1. Prior probability of having the disease: ≥ 0.013493
Probability of false positive for the test: ≤ 0.002196
Probability of false negative for the test: impossible

2. Reduced decision graph:



- 3.

(a) Decision for: $\{S = 1, G = 1, F = 1, M = 0\} = +$

Largest set of features to be turned off without changing decision = $\{S, G\}$ or $\{S, F\}$

Decision for: $\{S = 0, G = 0, F = 1, M = 0\} = +$

Decision for: $\{S = 0, G = 1, F = 0, M = 0\} = +$

(b) Decision for: $\{S = 1, G = 0, F = 1, M = 1\} = +$

Smallest set of features that render remaining features irrelevant: $\{F, M\}$

Decision for: $\{S = X, G = X, F = 1, M = 1\} = +$

4.

(a) Prior marginal distribution for BMI: 34.6% for high and 65.4% for nothigh
Prior marginal distribution for blood pressure: 45.77% for high and 54.23% for nothigh

(b) Posterior marginal probability for over 60: 62.30% for older, 37.70% for younger

(c) The MAP for the two variables are: BloodPressure = nothigh and BMI = nothigh with $P(\text{map}, e) = 0.134855$, and $P(\text{map}|e) = 0.337137$

(d) For the MPE, the tuple with the highest probability in the joint distribution is:

| <u>Variable</u> | <u>Value</u> |
|-----------------|--------------|
| AgeCausal | Causal |
| BloodPressure | High |
| BMI | High |
| Over60 | Older |
| Sex | Male |
| SexCausal | Causal |

With probability $P(\text{mpe}, e) = 0.007812$, $P(\text{mpe}|e) = 0.144668$