Solution 1.1

a) One way of showing this is by checking whether relH(A=1 | G=‘M‘) = relH(A=1 | G=‘W‘):

relH(A=1 | G=‘M‘) $= \frac{9+9+54+54+27+27}{36+9+36+9+36+54+36+54+27+27+27+27} \approx 47.6\%$

relH(A=1 | G=‘W‘ ist): $= \frac{18+36+18+36+12+24}{72+18+144+36+12+18+24+36+12+12+24+24} \approx 33.3\%$

Since both are unequal, gender and acceptance are stochastically dependent on each other.

b) The main thing to check is whether A and G are independently conditional on F.

To check this, one can, for example, check whether

relH(A=1 | G=‘M‘, F=’Informatik’) = relH(A=1 | G=‘W‘, F=’Informatik’) **AND**

relH(A=1 | G=‘M‘, F=IntMgmt) = relH(A=1 | G=‘W‘, F=IntMgmt) **AND**

relH(A=1 | G=‘M‘, F=WI) = relH(A=1 | G=‘W‘, F=WI) :

relH(A=1 | G=‘M‘, F=’Informatik’) $= \frac{9+54+27}{36+9+36+54+27+27} = 0.60$

relH(A=1 | G=‘W‘, F=’Informatik’) $= \frac{27+27+18}{18+27+108+27+18+18} = 0.60$

and similarly:

relH(A=1 | G=‘M‘, F=IntMgmt) =…=0.20
relH(A=1 | G=‘W‘, F=IntMgmt)=…=0.20 and similarly

relH(A=1 | G=‘M‘, F=WI) =…=0.5
relH(A=1 | G=‘W‘, F=WI)=…=0.5

The acceptance rates for the three subjects are therefore 60%, 20%, and 50%, respectively – for both, men and women. Conditional on the subject, gender and acceptance are therefore independent. The subject therefore fully explains the relationship between gender and acceptance.

c)

i) Since A is independent of G conditional on F, G is useless if F is available as input. G can therefore be omitted.

ii) In spite of (a) there is no indication of gender discrimination because of (b).