Task 2

Calculating marginal probabilities for P(S1):

1. Calculating using belief propagation:

Calculating message from g to S1

-----------------🡪 Marginalize over E1 --🡪 [ 0.2 0.5]

Calculate message from f to S1 -> [0.9 0.1]

Marginalize probability: P(S1)

Normalize [0.2 0.5] \* [0.9 0.1] = [0.7828 0.217]

2.Maximum probability:

By brute force,P(S1 = 0,E1 = 1) = 0.726

P(S1 = 0,E1 = 0) = 0

P(S1 = 1,E1 =0) = 0

P(S1 =1,E1 = 1) = 0.2016

P max = maxx   X s∈ne(x) µf→x(x)  

Maximum probability = P(S1 = 0,E1 = 1) = 0.726. So the state P(S1 = 0,E1 = 1) maximizes the probability.

P(S1 = 0) = 0 + 0.726 = 0.726

P(S1 =1) = 0 + 0.2016 = 0.2016