Task 2.6

Hand calculate Task 2.2:

$$P(S_1) = \mu_{f\to S_1}(S_1)\mu_{g\to S_1}(S_1)$$
$$= f(S_1)\cdot\left(\sum_{E_1} g(S_1, E_1)\cdot 1\right)$$

Thus,

$$P(S_1 = 0) = f(S_1 = 0)\cdot\left(\sum_{E_1} g(S_1, E_1)\right)$$
$$= f(S_1 = 0)\cdot\big(g(S_1 = 0, E_1 = 0) + g(S_1 = 0, E_1 = 1)\big)$$
$$= 0.85\cdot(0.1 + 0.2)$$
$$= 0.255$$

$$P(S_1 = 1) = f(S_1 = 1)\cdot\left(\sum_{E_1} g(S_1, E_1)\right)$$
$$= f(S_1 = 1)\cdot\big(g(S_1 = 1, E_1 = 0) + g(S_1 = 1, E_1 = 1)\big)$$
$$= 0.15\cdot(0 + 0.5)$$
$$= 0.075$$

Normalizing the probabilities, we obtain

$$P(S_1 = 0) = \frac{0.255}{0.255 + 0.075} = 0.7727$$
$$P(S_1 = 1) = \frac{0.075}{0.255 + 0.075} = 0.2273$$

Hand calculate Task 2.4:

$$P(S_1 = 0) = f(S_1 = 0)\cdot g(S_1 = 0, E_1 = 1)$$
$$= 0.85\cdot 0.2$$
$$= 0.17$$
$$P(S_1 = 1) = f(S_1 = 1)\cdot g(S_1 = 1, E_1 = 1)$$
$$= 0.15\cdot 0.5$$
$$= 0.075$$

Normalizing the probabilities, we obtain

$$P(S_1 = 0) = \frac{0.17}{0.17 + 0.075} = 0.6939$$
$$P(S_1 = 1) = \frac{0.075}{0.17 + 0.075} = 0.3061$$