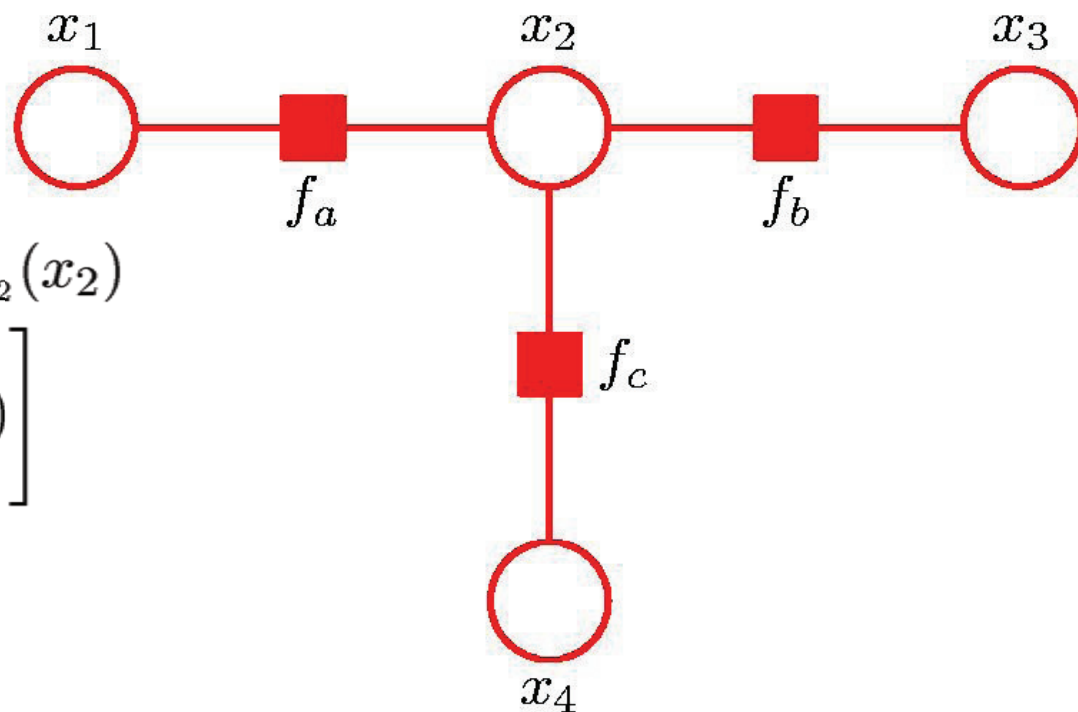- We can check that the marginal is given by the correct expression:

$$\widetilde{p}(\mathbf{x}) = f_a(x_1, x_2) f_b(x_2, x_3) f_c(x_2, x_4)$$

$$\widetilde{p}(x_2) = \mu_{f_a \to x_2}(x_2) \mu_{f_b \to x_2}(x_2) \mu_{f_c \to x_2}(x_2)$$

$$= \left[\sum_{x_1} f_a(x_1, x_2) \right] \left[\sum_{x_3} f_b(x_2, x_3) \right]$$

$$\left[\sum_{x_4} f_c(x_2, x_4) \right]$$

$$= \sum_{x_1} \sum_{x_3} \sum_{x_4} f_a(x_1, x_2) f_b(x_2, x_3) f_c(x_2, x_4)$$

$$= \sum_{x_1} \sum_{x_3} \sum_{x_4} \widetilde{p}(\mathbf{x})$$