2] $E\left(\hat{f}(X=1) \mid (X=1)\right]$

$$P\left(\hat{f}(X=1) \mid (X=1)\right) = \begin{cases} \hat{f}=0 & 0.1 \,/\, 0.4 = 1/4 \\ \hat{f}=1 & 0.3 \,/\, 0.4 = 3/4 \end{cases}$$

$$E\left[\hat{f}(X=1) \mid (X=1)\right] = \sum_{\hat{f}=0}^{1} \hat{f} \cdot P(\hat{f} \mid X=x)$$

$$= (0) \times \left(\frac{1}{4}\right) + (1) \times \left(\frac{3}{4}\right) = \frac{3}{4}$$