One note: If X and Y are independent, then $E(X|Y=y) = E(X)$.

Why? If X is discrete:

$$E(X|Y=y) = \sum_x (x) p_{X|Y}(x|y) = \sum_x (x) p_X(x) = E(X).$$

$$\underbrace{\phantom{p_{X|Y}(x|y)}}_{} = p_X(x) \text{ if } X, Y \text{ indep.}$$

If X is continuous:

$$E(X|Y=y) = \int_{-\infty}^{\infty} (x) f_{X|Y}(x|y) \, dx = \int_{-\infty}^{\infty} (x) f_X(x) dx = E(X).$$

$$\underbrace{\phantom{f_{X|Y}}}_{} = f_X(x) \text{ if } X, Y \text{ indep}$$