$$B_1'(X=j) = \sum_s P(X_1 = j \mid X_0 = s)$$

$$= P(X_1 = j \mid X_0 = j) B_0(X=j) +$$
$$P(X_1 = j \mid X_0 = r) B_0(X=r)$$

$$= (0.7)(0.5) + (0.2)(0.5)$$
$$= 0.45$$

$$B_1'(X=r) = P(X_1 = r \mid X_0 = j) B_0(X=j) +$$
$$P(X_1 = r \mid X_0 = r) B_0(X=r)$$

$$= (0.3)(0.5) + (0.8)(0.5) = 0.55$$

$$B_1(X=j) = P(X_1 = j \mid E_1 = m, B_0(X_0 = j))$$

$$= \frac{P(E_1 = m \mid X_1 = j) B_1'(X=j)}{P(E_1 = m)} \quad \frac{0.5 \cdot 0.45}{0.72}$$

$$= \boxed{0.3125}$$

$$P(E_1 = m) = P(E_1 = m \mid X_1 = j)(P(X_1 = j) +$$
$$P(E_1 = m \mid X_1 = r) P(X_1 = r) = \boxed{0.72}$$

$$B_1(X=r) = \frac{P(E_1 = m \mid X_1 = r) B_1'(X=r)}{P(E_1 = m)} = \boxed{0.6875}$$