参考答案

1. A、B、C

2. 由题目知 $P(B=0)=0.1$，$P(F=0)=0.2$，$P(G=0|B=1,F=1)=0.2$，$P(G=0|B=1,F=0)=0.8$，$P(G=0|B=0,F=1)=0.8$，$P(G=0|B=0,F=0)=0.9$

(1) G的状态被观察到为0.

$$P(G=0)=\sum_{B\in\{0,1\}}\sum_{F\in\{0,1\}}P(G=0|B,F)P(B)P(F)$$

$$=P(G=0|B=0,F=0)P(B=0)P(F=0)$$
$$+P(G=0|B=0,F=1)P(B=0)P(F=1)$$
$$+P(G=0|B=1,F=0)P(B=1)P(F=0)$$
$$+P(G=0|B=1,F=1)P(B=1)P(F=1)$$
$$=0.9\times0.1\times0.2+0.8\times0.1\times0.8+0.8\times0.9\times0.2+0.2\times0.9\times0.8$$
$$=0.3780$$

$$P(G=0|F=0)=\sum_{B\in\{0,1\}}P(G=0|B,F=0)P(B)$$
$$=P(G=0|B=0,F=0)P(B=0)+P(G=0|B=1,F=0)P(B=1)$$
$$=0.9\times0.1+0.8\times0.9=0.81$$

$$P(F=0|G=0)=\frac{P(G=0|F=0)P(F=0)}{P(G=0)}=\frac{0.81\times0.2}{0.3780}=0.4378$$

所以，观察到G=0后，F=0的概率从0.2上升到0.4378.

(2) 进一步，观察到B=0.

$$P(G=0|B=0)=\sum_{F\in\{0,1\}}P(G=0|B=0,F)P(F)$$
$$=P(G=0|B=0,F=0)P(F=0)+P(G=0|B=0,F=1)P(F=1)$$
$$=0.9\times0.2+0.8\times0.8=0.82$$

$$P(G=0|B=0,G=0)=\frac{P(G=0|B=0,F=0)P(F=0)}{P(G=0|B=0)}$$
$$=\frac{0.9\times0.2}{0.82}=0.2195.$$

所以，观察到B=0后，F=0的概率从0.4378又降到0.2195.