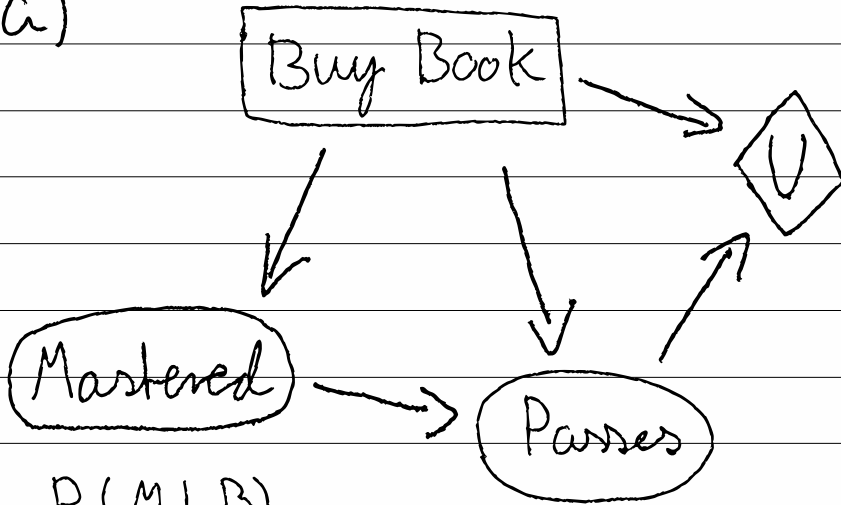


Exercise 3

1. a)



$P(M|B)$

B	M	Probability
T	T	0.90
T	F	0.10
F	T	0.65
F	F	0.35

$P(P|B, M)$

B	M	P	Probability
T	T	T	0.9
T	T	F	0.1
T	F	T	0.4
T	F	F	0.6
F	T	T	0.7
F	T	F	0.3
F	F	T	0.2
F	F	F	0.8

$Utility(B, P)$

B	P	Utility
F	F	0
F	T	2100
T	F	-150
T	T	1950

$$b) EU(B = \text{True}) = \sum_s Pr(s | B = \text{True}) U(s)$$

$$= Pr(P = T | B = T) \cdot U(P = T, B = T) \text{ (I)} \\ + Pr(P = F | B = T) \cdot U(P = F, B = T) \text{ (II)}$$

$$Pr(P | B) =$$

$$Pr(M | B) \cdot Pr(P | B, M) \\ + Pr(\neg M | B) \cdot Pr(P | B, \neg M) \\ = 0.90 \cdot 0.9 + 0.10 \cdot 0.4 = \underline{0.85}$$

$$Pr(\neg P | B) =$$

$$Pr(M | B) \cdot Pr(\neg P | B, M) \\ + Pr(\neg M | B) \cdot Pr(\neg P | B, \neg M) \\ = 0.90 \cdot 0.1 + 0.10 \cdot 0.6 = \underline{0.15} \text{ OK}$$

$$\text{(I): } 0.85 \cdot 1950 = 1657.5$$

$$\text{(II): } 0.15 \cdot (-150) = -22.5$$

$$\Rightarrow EU(B = \text{True}) = \text{I} + \text{II} = \underline{1635}$$

$$EU(B = \text{False}) = \sum_s Pr(s | B = \text{False}) U(s)$$

$$= Pr(P = T | B = F) \cdot U(P = T, B = F) \text{ (I)} \\ + Pr(P = F | B = F) \cdot U(P = F, B = F) \text{ (II)}$$

$$Pr(P | \neg B) =$$

$$Pr(M | \neg B) \cdot Pr(P | \neg B, M) \\ + Pr(\neg M | \neg B) \cdot Pr(P | \neg B, \neg M) \\ = 0.65 \cdot 0.7 + 0.35 \cdot 0.2 = 0.525$$

$$Pr(\neg P | \neg B) =$$

$$Pr(M | \neg B) \cdot Pr(\neg P | \neg B, M) \\ + Pr(\neg M | \neg B) \cdot Pr(\neg P | \neg B, \neg M) \\ = 0.65 \cdot 0.3 + 0.35 \cdot 0.8 = 0.475 \text{ OK}$$

$$\text{(I): } 0.525 \cdot 2100 = 1102.5$$

$$\text{(II): } 0.475 \cdot 0 = 0$$

$$\Rightarrow EU(B = \text{False}) = I + II = \underline{\underline{1102.5}}$$

$$EU(B) > EU(\neg B)$$

$\Rightarrow B \approx \neg B$, The rational thing for Geir to do is to buy the book!