策略競局

U1.

(a)

		DEFENSE	
		RUN_q	$PASS_{1-q}$
OFFENSE	RUN_p	(1, -1)	(6, -5)
	$PASS_{1-p}$	(9, -9)	(-3, 3)

利用 best-response 分析，無法找出 Nash equilibrium，故此賽局為 no pure-strategy Nash equilibrium.

60/60

(b)

令 anticipate run 之機率為 q，anticipate pass 為 $(1-q)$

run (OFFENSE) 之機率為 p，pass 為 $(1-p)$

$(-1)\cdot p + (1-p)\cdot 6 = (-5)\cdot p + 3\cdot(1-p)$

$\Rightarrow p = \frac{3}{4}$

$1\cdot q + 5\cdot(1-q) = 9\cdot q + (-3)\cdot(1-q)$

$\Rightarrow q = \frac{1}{2}$

$\Rightarrow$ Mixed strategy 為 OFFENSE ($\frac{3}{4}$ run + $\frac{1}{4}$ pass)

DEFENSE ($\frac{1}{2}$ anticipate run + $\frac{1}{2}$ anticipate pass) #

(c)

為了讓對方無法預測自己的行動，因此求出一個機率讓選擇 run 和 pass 的期望值相等，但因各種策略的 payoff 皆不同，故求出之 mixed-strategy 不會相同。 #

(d)

$1\times p\cdot q + 5\cdot p\cdot(1-q) + 9\cdot q\cdot(1-p) + (-3)\cdot(1-p)(1-q) = 3$ #

U2.

(a) 令 professor help 之機率為 p，ignore 為 $(1-p)$

student work 之機率為 q，slack 為 $(1-q)$

$3\cdot q + (-1)\cdot(1-q) = (-2)\cdot q + 0$

$\Rightarrow q = \frac{1}{6}$

$3p + 1\cdot(1-p) = 4\cdot p + 0$

$p = \frac{1}{2}$

mixed-strategy

$\Rightarrow$ professor ($\frac{1}{2}$ help + $\frac{1}{2}$ ignore

student ($\frac{1}{6}$ work and ask + $\frac{5}{6}$ slack and fish) #

(b)

$3\cdot\frac{1}{2}\cdot\frac{1}{6} + (-1)\cdot\frac{5}{6}\cdot\frac{1}{2} + (-2)\cdot\frac{1}{2}\cdot\frac{1}{6} + 0 = -\frac{1}{3}$ (professor)

$3\cdot\frac{1}{2}\cdot\frac{1}{6} + 4\cdot\frac{5}{6}\cdot\frac{1}{2} + 1\cdot\frac{1}{2}\cdot\frac{1}{6} + 0 = 2$ (student) #

U9,

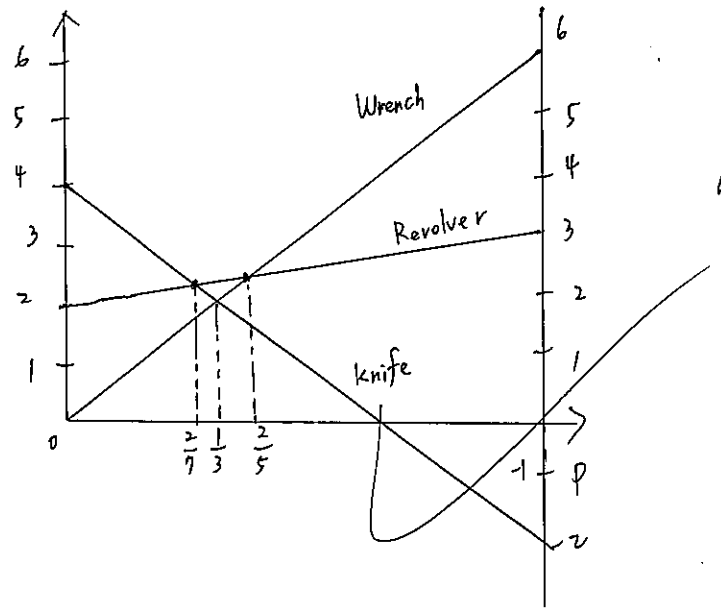
(a)

		Professor Plum		
		Revolver	Knife	Wrench
Mrs. Peacock	Conservatory (p)	(1,3)	(2,-2)	(0,6)
	Ballroom (1-p)	(3,2)	(1,4)	(5,0)

$3\cdot p + 2\cdot(1-p) = p+2$

$-2\cdot p + 4\cdot(1-p) = 4-6p$

$6\cdot p + 0 = 6p$



$p+2 = 4-6p \Rightarrow p = \frac{2}{7}$

$p+2 = 6p \Rightarrow p = \frac{2}{5}$

$4-6p = 6p \Rightarrow p = \frac{1}{3}$

(b)

Professor Plum will use knife & revolver, because this choice will make Mrs. Peacock's Payoff as low as possible ($p = \frac{2}{7}$)

(c)

	Revolver (q)	knife (1-q)
Conservatory (p)	(1,3)	(2,-2)
Ballroom (1-p)	(3,2)	(1,4)

$$\begin{cases} q+2\cdot(1-q) = 3q+1\cdot(1-q) \\ 3p+2(1-p) = -2p+4(1-p) \end{cases} \Rightarrow \begin{cases} p = \frac{2}{7} \\ q = \frac{1}{3} \end{cases}$$

Mixed - strategy

Mrs. Peacock ($\frac{2}{7}$ conservatory + $\frac{5}{7}$ ballroom)

Professor Plum ($\frac{1}{3}$ revolver + $\frac{2}{3}$ knife)

(d) payoff 不同，因此影響到不同的 mixed strategy.