22-S1-Q5

Q: (a) (i) pessimism

Solution Maximin $-5 > -10 > -20 > -30$

Mr. chen should invest Condominium (C)

(ii) optimism

Solution Maximax $30 > 25 > 20 > 15$

Mr. chen should invest shop (S)

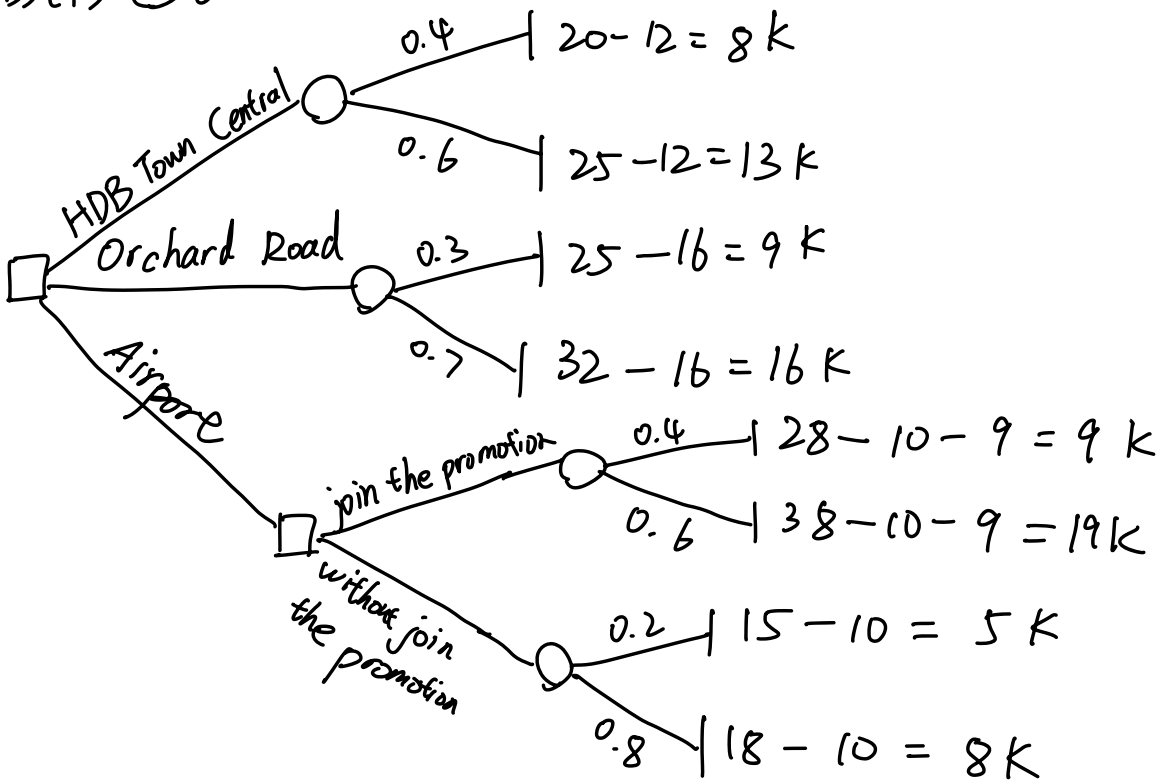
(iii) regret

	E1	E2	E3	r_{ij}
I	-10	10	20	$-5 - r_{i1}$
O	-20	12	25	$15 - r_{i2}$
S	-30	15	30	$30 - r_{i3}$
C	-5	10	15	
Max	-5	15	30	

	E1	E2	E3		
I	~~-10~~ 5	~~10~~ 5	~~20~~ 10	(10)	minimax regret
O	~~-20~~ 15	~~12~~ 3	~~25~~ 5	15	
S	~~-30~~ 25	~~15~~ 0	~~30~~ 0	25	
C	~~-5~~ 0	~~10~~ 5	~~15~~ 15	15	
Max	-5	15	30		

So, Mr. chen should invest Industrial (I)

(b)(i) ① draw decision tree



② use the $u(x)=\sqrt{\frac{\max\{x+2,0\}}{21}}$ to compute profit utility

$$u(8)=\sqrt{\frac{8+2}{21}}=0.6901$$

$$u(13)=\sqrt{\frac{13+2}{21}}=0.8452$$

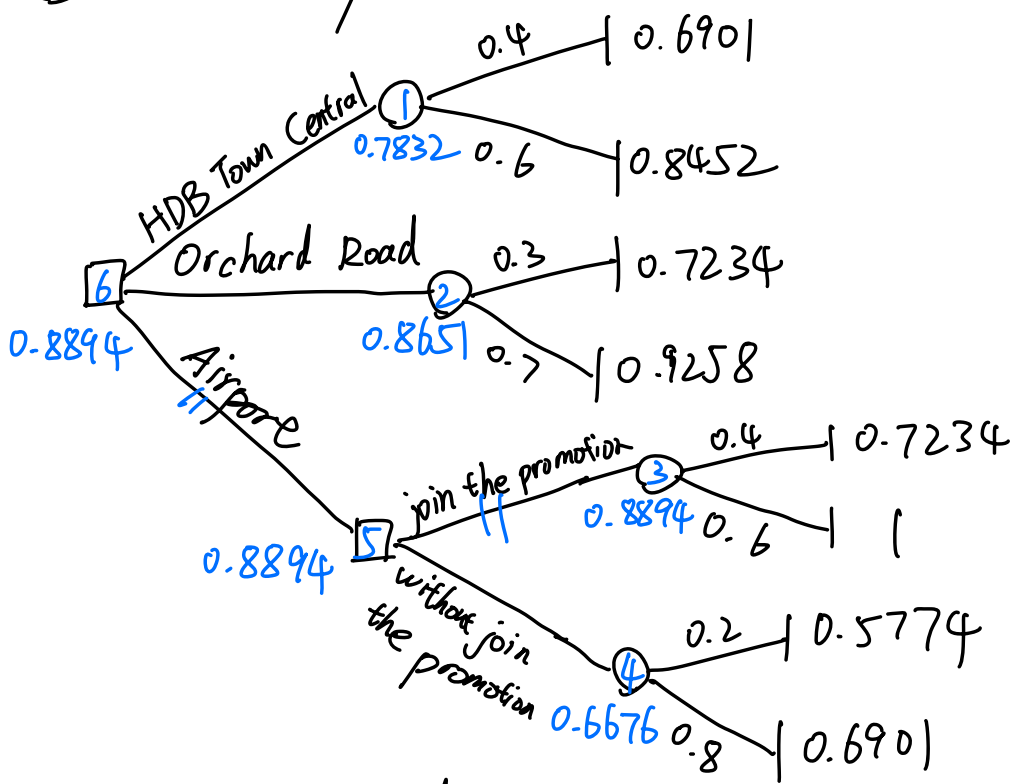
$$u(9)=\sqrt{\frac{9+2}{21}}=0.7237$$

$$u(16)=\sqrt{\frac{16+2}{21}}=0.9258$$

$u(19) = \sqrt{\frac{19+2}{21}} = 1$

$u(5) = \sqrt{\frac{5+2}{21}} = 0.5774$

③ So utility decision tree



④ compute to decision

$0.4 \times 0.6901 + 0.6 \times 0.8452 = 0.78316 = 0.7832$

$0.3 \times 0.7234 + 0.7 \times 0.9258 = 0.86508 = 0.8651$

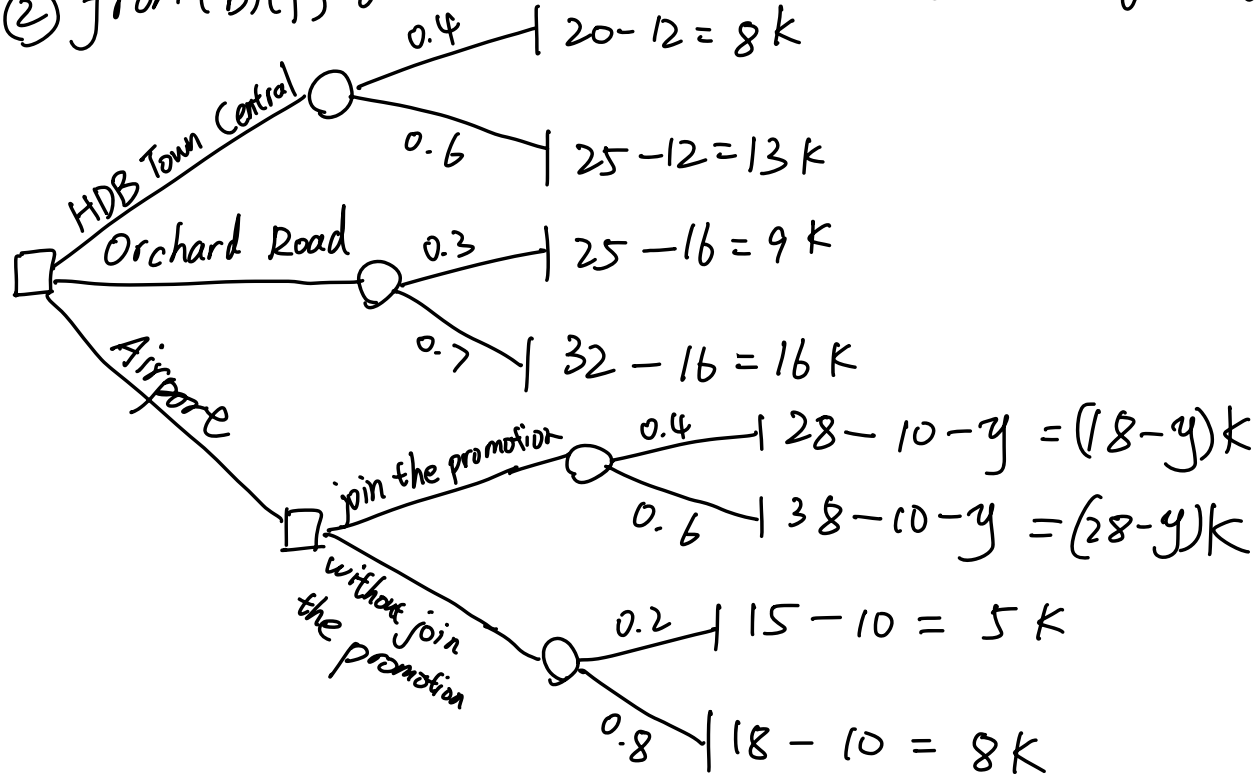
$0.4 \times 0.7234 + 0.6 \times 1 = 0.88936 = 0.8894$

$0.2 \times 0.5774 + 0.8 \times 0.6901 = 0.66756 = 0.6676$

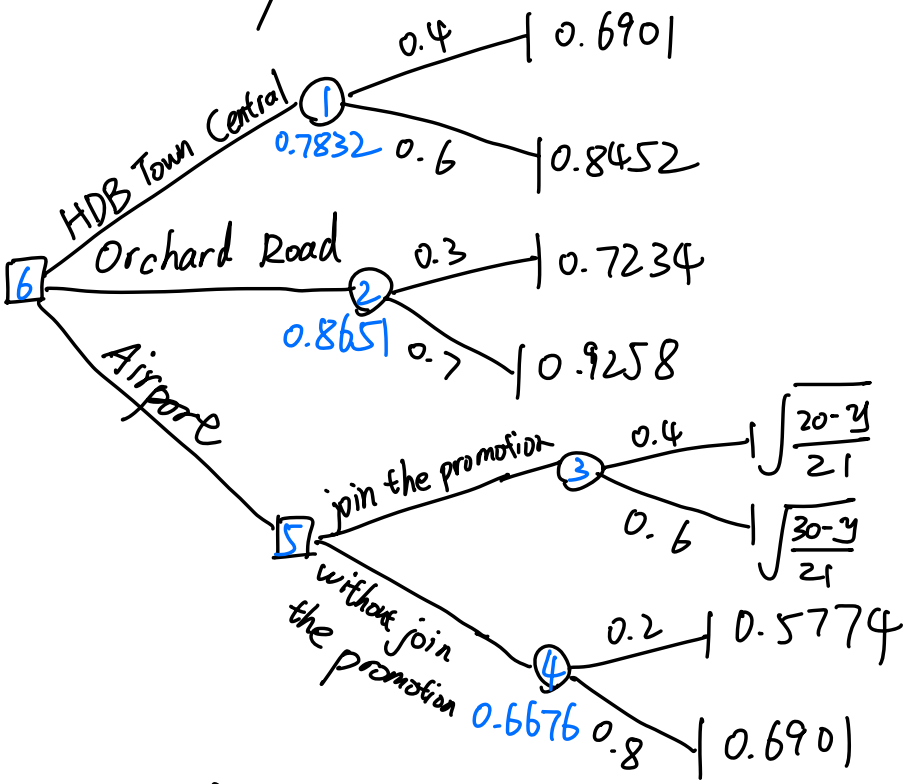
⑤ So, the best outlet location is the airport and join the airport promotion

(ii) ① Since U(without join airport promotion) <
U(HDB) < U(Orchard Road)
< U(join the airport promotion),
when the promotion fee change higher,
and the utily of Orchard Road is higher
than utily of join the airport promotion
I will change the amswer in (b)(i)
to choose Orchard Road

② from (b)(i) decision tree, and the fee change to y



③ So utility decision tree



④ position 3

$$0.4\sqrt{\frac{20-y}{21}}+0.6\sqrt{\frac{30-y}{21}} < 0.8651$$

solve the equation using casio

$y > 9.8755$

⑤ So when $y > 9.8755$, I will change the answer in (b)(i)