Congratulations! You passed!

TO PASS 70% or higher

Keep Learning

GRADE
100%

Final Exam

LATEST SUBMISSION GRADE

100%

1.

1 / 1 point

1\ 2	x	y	z
a	2,5	2,1	0,1
b	3,2	4,4	1,1
c	1,0	1,1	1,2

Find the strictly dominant strategies (click all that apply: there may be zero, one or more and remember the difference between strictly dominant and strictly dominated):

- [ ] x;
- [ ] b;
- [ ] c;
- [x] none

Correct

No strategy is a strictly dominant strategy.

- **a** is strictly dominated by **b** and so is not dominant;
- if 2 plays z then 1 is indifferent between **c** and **b**, while if 2 plays y then **b** is strictly better than **c**, and so neither is strictly dominant.
- Similarly, when 1 plays **a**, x is the unique best response for 2; when 1 plays **b**, y is the unique best response for 2; when 1 plays **c**, z is the unique best response for 2, and so none of them is dominant.

- [ ] y;
- [ ] z;
- [ ] a;

2.

1 / 1 point

1\ 2	x	y	z
a	2,5	2,1	0,1
b	3,2	4,4	1,1
c	1,0	1,1	1,2

Find the weakly dominated strategies (click all that apply: there may be zero, one or more):

- [ ] y;
- [ ] z;
- [ ] x;
- [x] a;

Correct

(a) and (c) are correct.

- For 1, both **c** and **c** are weakly dominated by **b**. When 2 plays x or y, **b** is strictly better than **c**; when 2 plays z, 1 is indifferent between **b** and **c**.
- From the previous answer, player 2 has no weakly dominated strategies.

- [ ] b;

☑ c;

Correct

(a) and (c) are correct.

- For 1, both c and c are weakly dominated by b. When 2 plays x or y, b is strictly better than c; when 2 plays z, 1 is indifferent between b and c.
- From the previous answer, player 2 has no weakly dominated strategies.

3. 1 / 1 point

1\ 2	x	y	z
a	2,5	2,1	0,1
b	3,2	4,4	1,1
c	1,0	1,1	1,2

Which strategies survive the process of iterative removal of strictly dominated strategies (click all that apply: there may be zero, one or more)?

☑ b;

Correct

(b), (c), (y) and (z) are the survivors.

- a is dominated by b.
- x is dominated by y, once a is removed.
- No further removals can be made.

☐ a;

☑ z;

Correct

(b), (c), (y) and (z) are the survivors.

- a is dominated by b.
- x is dominated by y, once a is removed.
- No further removals can be made.

☐ x;

☑ y;

Correct

(b), (c), (y) and (z) are the survivors.

- a is dominated by b.
- x is dominated by y, once a is removed.
- No further removals can be made.

☑ c;

Correct

(b), (c), (y) and (z) are the survivors.

- a is dominated by b.
- x is dominated by y, once a is removed.
- No further removals can be made.

4. 1 / 1 point

1\ 2	x	y	z
a	2,5	2,1	0,1
b	3,2	4,4	1,1
c	1,0	1,1	1,2

Find all strategy profiles that form pure strategy Nash equilibria (click all that apply: there may be zero, one or more):

- [ ] (a, x);
- [ ] (b, x);
- [ ] (b, z);
- [ ] (a, z);
- [x] (b, y);

Correct
(b, y) and (c, z) are pure-strategy Nash equilibria.

- It is easy to check the pure-strategy Nash equilibrium: no one wants to deviate.
- In any of the other combinations at least one player has an incentive to deviate. Thus, they are not equilibria.

- [ ] (a, y);
- [ ] (c, y);
- [x] (c, z).

Correct
(b, y) and (c, z) are pure-strategy Nash equilibria.

- It is easy to check the pure-strategy Nash equilibrium: no one wants to deviate.
- In any of the other combinations at least one player has an incentive to deviate. Thus, they are not equilibria.

- [ ] (c, x);

5. 1 / 1 point

1\ 2	y	z
b	4,4	1,1
c	1,1	2,2

Which of the following strategies form a mixed strategy Nash equilibrium? (p corresponds to the probability of 1 playing b and $1-p$ to the probability of playing c; q corresponds to the probability of 2 playing y and $1-q$ to the probability of playing z).

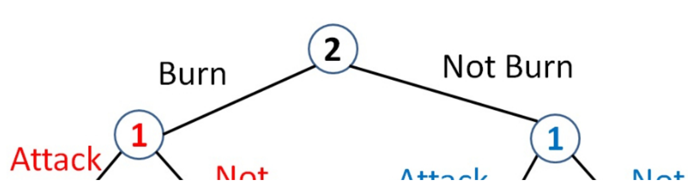
- (●) $p = 1/4, q = 1/4;$
- ( ) $p = 2/3, q = 1/4;$
- ( ) $p = 1/3, q = 1/4;$
- ( ) $p = 1/3, q = 1/3;$

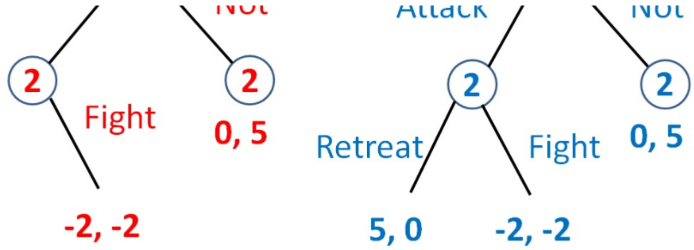
Correct
($p = 1/4, q = 1/4$) is true.

- In a mixed strategy equilibrium in this game both players must mix and so 1 must be indifferent between b and c, and 2 between y and z.
- b gives 1 an expected payoff: $4q + (1-q)$
- c gives 1 an expected payoff: $1q + 2(1-q)$
- Setting these two payoffs to be equal leads to $q = 1/4$.
- By symmetry we have $p = 1/4$.

6. 1 / 1 point

- One island is occupied by Army 2, and there is a bridge connecting the island to the mainland through which Army 2 could retreat.
- Stage 1: Army 2 could choose to burn the bridge or not in the very beginning.
- Stage 2: Army 1 then could choose to attack the island or not.
- Stage 3: Army 2 could then choose to fight or retreat if the bridge was not burned, and has to fight if the bridge was burned.





First, consider the blue subgame. What is a subgame perfect equilibrium of the

blue subgame?

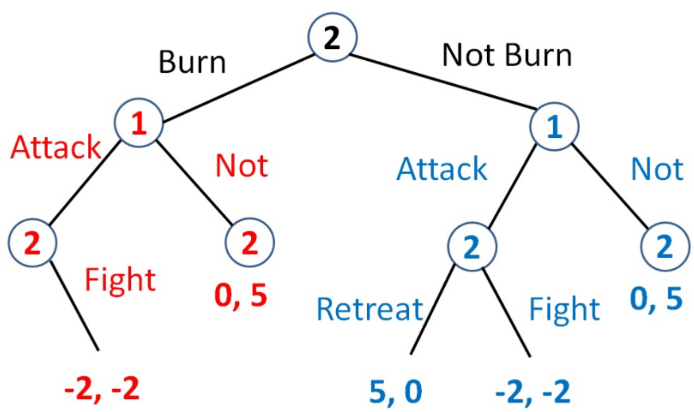
- (Not, Retreat).
- (Attack, Fight).
- (Not, Fight).
- (Attack, Retreat).

Correct
(Attack, Retreat) is true.

- At the subgame when 1 attacks, it is better for 2 to retreat with a payoff (5, 0).
- If 1 doesn't attack, the payoff is (0, 5).
- It is thus optimal for 1 to attack, and so (Attack, Retreat) is the unique subgame prefect equilibrium in this subgame.

7. 1 / 1 point

- One island is occupied by Army 2, and there is a bridge connecting the island to the mainland through which Army 2 could retreat.
- Stage 1: Army 2 could choose to burn the bridge or not in the very beginning.
- Stage 2: Army 1 then could choose to attack the island or not.
- Stage 3: Army 2 could then choose to fight or retreat if the bridge was not burned, and has to fight if the bridge was burned.



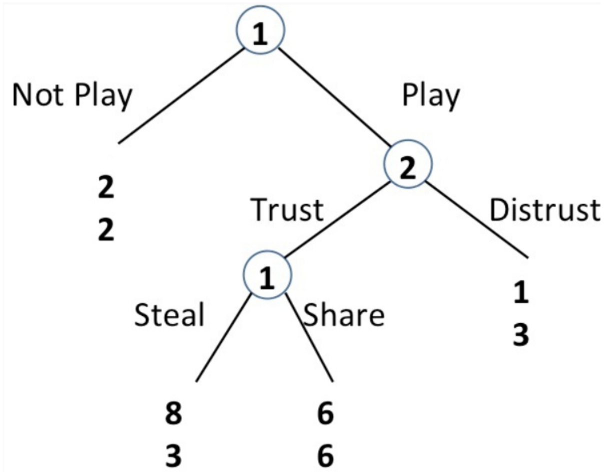
What is the outcome of a subgame perfect equilibrium of the whole game?

- Bridge is burned, 1 does not attack.
- Bridge is not burned, 1 attacks and 2 retreats.
- Bridge is not burned, 1 does not attack.
- Bridge is burned, 1 attacks and 2 fights.

Correct
(Bridge is burned, 1 does not attack) is true.

- At the subgame when the bridge is not burned, the equilibrium outcome is (5, 0) from the previous question.
- If the bridge is burned:
- If 1 attacks, 2 has to fight and gets (-2, -2);
- If 1 doesn't attack, the payoff is (0, 5).
- 1 is better off not attacking, with a payoff (0, 5).
- Thus, it is better for 2 to burn the bridge, which leads to (0, 5) instead of (5, 0).

8. Consider an infinitely repeated game where the game in each period is depicted in the picture. 1 / 1 point



There is a probability p that the game continues next period and a probability $(1-p)$ that it ends. What is the threshold p^* such that when $p \geq p^*$ ((Play,Share), (Trust)) is sustainable as a subgame perfect equilibrium by a grim trigger strategy, but when $p < p^*$ ((Play,Share), (Trust)) can't be sustained as a subgame perfect equilibrium?

[Here a trigger strategy is: player 1 playing Not play and player 2 playing Distrust forever after a deviation from ((Play,Share), (Trust)).]

- ○ 2/3;
- ○ 1/4.
- ◉ 1/3;
- ○ 1/2;

✓ **Correct**
(1/3) is true.

- In the infinitely repeated game supporting ((Play,Share), (Trust)):
- Suppose player 2 uses the grim trigger strategy: start playing Trust and play Distrust forever after a deviation from ((Play,Share), (Trust)).
- If player 1 deviates and plays (Play, Steal), player 1 earns $8-6=2$ more in the current period, but loses 4 from all following periods, which is $4p/(1-p)$ in total.
- Thus in order to support ((Play,Share), (Trust)), the threshold is $2 = 4p/(1-p)$, which is $p = 1/3$.
- Note that given player 1's strategy, player 2 has no incentive to deviate for any value of p.

9. 1 / 1 point

- There are two players.
- The payoffs to player 2 depend on whether 2 is a friendly player (with probability p) or a foe (with probability $1-p$).
- Player 2 knows if he/she is a friend or a foe, but player 1 doesn't know.

See the following payoff matrices for details.

Friend	Left	Right
Left	3,1	0,0
Right	2,1	1,0

with probability p

Foe	Left	Right
Left	3,0	0,1
Right	2,0	1,1

with probability $1-p$

When $p = 1/4$, which is a pure strategy Bayesian equilibrium:

(1's strategy; 2's type - 2's strategy)

- ○ (Left ; Friend - Left, Foe - Left);
- ○ (Right ; Friend - Right, Foe - Right);
- ◉ (Right ; Friend - Left, Foe - Right);
- ○ (Left ; Friend - Left, Foe - Right);

Correct

(Right ; Friend - Left, Foe - Right) is true.

- For player 2, Left is strictly dominant when a friend and Right when a foe. Thus, that must be 2's strategy in any equilibrium.
- Conditional on 2's strategy, 1 gets an expected payoff of $3p = 3/4$ when choosing Left and $2p + (1 - p) = 5/4$ when choosing Right. Thus, 1's best response is to play Right.
- It is easy to check that in any of the remaining options, at least one player has an incentive to deviate.

10. Player 1 is a company choosing whether to enter a market or stay out;

1 / 1 point

- If 1 stays out, the payoff to both players is (0, 3).

Player 2 is already in the market and chooses (simultaneously) whether to fight

player 1 if there is entry

- The payoffs to player 2 depend on whether 2 is a normal player (with prob $1 - p$) or an aggressive player (with prob p).

See the following payoff matrices for details.

Aggressive	Fight	Not
Enter	-1,2	1,-2
Out	0,3	0,3

with probability p

Normal	Fight	Not
Enter	-1,0	1,2
Out	0,3	0,3

with probability $1 - p$

Player 2 knows if he/she is normal or aggressive, and player 1 doesn't know. Which are true (click all that apply, there may be zero, one or more):

- [x] When $p = 1/2$, it is a Bayesian equilibrium for 1 to enter, 2 to fight when aggressive

and not when normal;

Correct

All are true.

- When 1 enters, it is optimal for the aggressive type to fight and for the normal type not to fight; and those actions don't matter when 1 stays out.
- Conditional on 2's strategy, it is optimal for 1 to enter when $p < 1/2$, it is optimal for 1 to stay out when $p > 1/2$ and it is indifferent for 1 to enter or to stay out when $p = 1/2$.

- [x] When $p < 1/2$, it is a Bayesian equilibrium for 1 to enter, 2 to fight

when aggressive and not when normal.

Correct

All are true.

- When 1 enters, it is optimal for the aggressive type to fight and for the normal type not to fight; and those actions don't matter when 1 stays out.
- Conditional on 2's strategy, it is optimal for 1 to enter when $p < 1/2$, it is optimal for 1 to stay out when $p > 1/2$ and it is indifferent for 1 to enter or to stay out when $p = 1/2$.

- [x] When $p > 1/2$, it is a Bayesian equilibrium for 1 to stay out, 2 to fight

when aggressive and not when normal;

Correct

All are true.

- When 1 enters, it is optimal for the aggressive type to fight and for the normal type not to fight; and those actions don't matter when 1 stays out.
- Conditional on 2's strategy, it is optimal for 1 to enter when $p < 1/2$, it is optimal for 1 to stay out when $p > 1/2$ and it is indifferent for 1 to enter or to stay out when $p = 1/2$.

- [x] When $p = 1/2$, it is a Bayesian equilibrium for 1 to stay out, 2 to fight when

aggressive and not when normal;

Correct

All are true.

- When 1 enters, it is optimal for the aggressive type to fight and for the normal type not to fight; and those actions don't matter when 1 stays out.
- Conditional on 2's strategy, it is optimal for 1 to enter when $p < 1/2$, it is optimal for 1 to stay out when $p > 1/2$ and it is indifferent for 1 to enter or to stay out when $p = 1/2$.