

MAT 364

Quiz 3

Fall 2020

1. Let Z be the property that a game is equal to its negative. Assume that Z is true for all impartial games of height at most 1. Let G be an impartial game of height 2. Which are true for any Left or Right option H of G ?

i) H is impartial ii) H has height at most 1 iii) $H = -H$
 a) i) and iii) only b) ii) only c) ii) and iii) only d) i) and ii) only e) all of the above

Correct Answer: all of the above

2. Let Z be the property that a game is equal to its negative. Which of the following fails to be true, or fails to be true by assumption, or fails to be provable, in attempting to prove by induction on game tree height that all *impartial* games are equal to their negatives ?

i) the base case ii) the induction step iii) the induction hypothesis
 a) i) only b) ii) only c) iii) only d) i) and ii) only e) none of the above

Correct Answer: none of the above

3. In the following domineering board, which squares should be crossed out so that the game is equal to 1?

1	2
3	4
5	6

a) 1,5 b) 1,3,5 c) 3,5 d) 5,6 e) 2,5

Correct Answer: 1,3,5

4. Same domineering board as in the previous problem. Which squares should be crossed out so that the game is equal to $*$?

a) 1,5 b) 1,3,5 c) 3,5 d) 5,6 e) 2,5

Correct Answer: 1,5

5. Same domineering board as in the previous problem. Which squares should be crossed out so that the game is equal to $\frac{1}{2}$?

a) 1,5 b) 1,3,5 c) 3,5 d) 5,6 e) 2,5

Correct Answer: 3,5

6. Let G be the amazons game below. What is the value of G ?

•		X
X		◦

- a) ± 1 b) $*$ c) $1 + *$ d) 0 e) $\{1|*\}$

Correct Answer: ± 1

7. Let G be the game defined as $G := \{0, 1, *|1, *\}$. Determine the outcome class of G :

- a) \mathcal{L} b) \mathcal{R} c) \mathcal{N} d) \mathcal{P} e) none of the above

Correct Answer: \mathcal{L}

8. Same game G as in the previous question. Find the correct description of $-G$:

- a) $\{0, -1, *| -1, *\}$ b) $\{-1, *|0, -1, *\}$ c) $\{-1, *|0, *\}$ d) $\{0, -1, *|0, -1, *\}$ e) $\{0, -1| -1, *\}$

Correct Answer: $\{-1, *|0, -1, *\}$

9. Which of the following is a dominated option in the game $1 + *$? (Draw the game tree then consider comparisons between options on the left side or options on the right side.)

- a) 1 b) $1 + *$ c) $*$ d) 0 e) -1

Correct Answer: $*$

10. What is the canonical form of the game $1 + *$?

- a) $\{1|1\}$ b) $\{1|*\}$ c) $\{*|1\}$ d) $\{*|*\}$ e) $\{0, *|0\}$

Correct Answer: $\{1|1\}$