MAT 364 **Quiz 2** Fall 2020

1. Assume that a property X of games is verified to be true for games of height zero. It is then also shown that if property X is assumed to be true for all games of height at most $n - 1$, then property X must be true for all games of height n. Now suppose that G is a particular game of height 12. In addition to the above, what do we need to do in order to prove that G has property X?

a) nothing   b) verify property X for $n = 12$ c) verify property X for $n = 11$ d) verify property X for $n \leq 11$ e) verify property X for $n \leq 12$

Correct Answer: nothing

2. Let Y be the property that a game is impartial. (A game is impartial if the options are the same for either player at any node of the game tree.) 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 games are impartial?

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: ii) only

3. Which of the following compound statements always evaluate to FALSE for any combinatorial game G?

i) Lwpf and Rwps   ii) Lwpf and Rwpf   iii) Lwps and Rwps

a) i) only   b) ii) only   c) iii) only   d) i) and ii) only   e) none of the above

Correct Answer: i) only

4. Let Y be the property that a game is in Lwpf or Rwps. 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 games are in Lwpf or Rwps?

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

5. The game Greedy Nim is played with one stack of size 6, and three stacks of size 2. How many counters should the first player take to win?

a) 1   b) 4   c) 2   d) 5   e) 3

Correct Answer: 4

6. The game of domineering is played on the board below. What is the outcome class of this game?

	X	

a) $\mathcal{L}$ b) $\mathcal{R}$ c) $\mathcal{N}$ d) $\mathcal{P}$ e) none

Correct Answer: $\mathcal{P}$

7. Same game as in the previous question. What is the height of the game tree?

a) 5 b) 4 c) 6 d) 7 e) 3

Correct Answer: 4

8. Same game as in the previous question. If the game is played by two players, what is the *minimum* number of moves that the game will last?

a) 5 b) 6 c) 7 d) 4 e) 3

Correct Answer: 3

9. Same game as in the previous question. If Left is going to play first, how many winning moves does Left have?

a) 0 b) 1 c) 3 d) 2 e) 4

Correct Answer: 0

10. Same game as in the previous question. If Right plays first, how many winning moves does Left have (after Right's first move)?

a) 0 b) 1 c) 3 d) 2 e) 4

Correct Answer: 1