Algorithmic Game Theory
Assignment 6

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1. Which of the following statements is wrong?

    (a) Every correlated equilibrium is also an MSNE.

    (b) Every correlated equilibrium is also a PSNE.

    (c) Every PSNE is also a correlated equilibrium.

    (d) Every MSNE need not be a correlated equilibrium.

    The correct answer is (c).
    Justification: Refer to week-6 lecture-2

2. Which of the following statements is correct?

    (a) A correlated equilibrium in a strategic form can be computed in polynomial-time.

    (b) An MSNE in a strategic form can be computed in polynomial-time.

    (c) A PSNE in a congestion game can be computed in polynomial-time.

    (d) A PSNE in a symmetric congestion game can be computed in polynomial-time.

    The correct answer is (a).

3. Which of the following statements is incorrect?

    (a) Every SDSE is a correlated equilibrium

    (b) Every correlated equilibrium is also a coarse correlated equilibrium

    (c) Every coarse correlated equilibrium is also an MSNE

    (d) Every PSNE is also a coarse correlated equilibrium

    The correct answer is (c).

4. What is the time-averaged external regret of the Hedge algorithm?

    (a) $\mathcal{O}\left(\frac{\log n}{T}\right)$

    (b) $\mathcal{O}\left(\frac{T}{\log n}\right)$

    (c) $\mathcal{O}\left(\sqrt{\frac{T}{\log n}}\right)$

    (d) $\mathcal{O}\left(\sqrt{\frac{\log n}{T}}\right)$

    The correct answer is (d).
    Justification: Refer to week-6 lecture-4

5. How many iterations we should run the multiplicative weight algorithm to ensure a time-averaged external regret of at most ε?

    (a) $\mathcal{O}\left(\frac{\log n}{\varepsilon^2}\right)$

    (b) $\mathcal{O}\left(\frac{\varepsilon^2}{\log n}\right)$

(c) $\mathcal{O}\left(\sqrt{\frac{\varepsilon}{\log n}}\right)$

(d) $\mathcal{O}\left(\sqrt{\frac{\log n}{\varepsilon^2}}\right)$

The correct answer is (a).

6. Which of the following equilibriums need a trusted third-party to implement?

   (a) PSNE

   (b) MSNE

   (c) WDSE

   (d) CE

   The correct answer is (d).

7. How many players are involved in the no-regret dynamics?

   (a) one

   (b) two

   (c) arbitrarily large

   (d) infinite

   The correct answer is (a).

8. For which of the following can be computed in polynomial time?

   (a) MSNE in symmetric congestion games

   (b) 0.01-approximate MSNE in a bimatrix game

   (c) 0.6-approximate MSNE in a bimatrix game

   (d) MSNE in a bimatrix game

   The correct answer is (c).

9. Which equilibrium concept models binding contracts?

   (a) MSNE

   (b) PSNE

   (c) CE

   (d) CCE

   The correct answer is (d).
   Justification: Refer to week-6 lecture-3

10. Which equilibrium concept models non-binding contracts?

   (a) MSNE

   (b) PSNE

   (c) CE

   (d) CCE

   The correct answer is (c).