Problem 1

Answer: No

Assume a Nash equilibrium with dominated strategies does exist. Then at least one player selected a dominated strategy. By definition, this is the worst strategy he could have selected. Consequently, this player has at least one option that leads to a higher payoff. By switching to this strategy, he can deviate from the Nash equilibrium and obtain a better outcome. However, this should not be possible. Therefore, our assumption must be wrong. We have just concluded that a Nash equilibrium with dominated strategies cannot exist.

Problem 2

Answer: Yes

Clearly, opting for the product placement leads to the highest payoff for Mars.

Problem 3

Answer: Yes

An example of a game with more than one Nash equilibrium is the Coordination Game.

Problem 4

Answer: Low Price

In this case, City Cuts corresponds to Player 1, and Toby's Hairstyle corresponds to Player 2. Consider the best reply by Player 1 for each strategy of Player 2:
▷ Player 2 chooses High Price: Player 1 chooses Low Price;
▷ Player 2 chooses Low Price: Player 1 chooses High Price.
Next, consider the best reply by Player 2 for each strategy of Player 1:
▷ Player 1 chooses High Price: Player 2 chooses High Price;
▷ Player 1 chooses Low Price: Player 2 chooses High Price.
For Player 2, choosing High Price is always the best strategy. If we assume that this player is rational, then this is the option he'll choose. In this case, the best reply by Player 1 is selecting Low Price. Notice that this situation corresponds to a Nash equilibrium.

Problem 5

Answer: matrix

Problem 6

Answer: 0

This game was discussed in one of the lectures. As explained, in this case there is no Nash equilibrium. Essentially, the idea is that the best strategy for one player leaves the worst strategy as the only option for the other player.

Problem 7

Answer: $2 < x < 5$

First recall that, for a game to be a prisoner's dilemma, the following must hold:
▷ non-cooperation is the best strategy for each player;
▷ mutual cooperation is superior to mutual non-cooperation.
With that in mind, let us analyze this game's payoff table. We begin by identifying the best reply by Player 1 for each strategy of Player 2:
▷ Player 2 chooses Advertise: Player 1 chooses Do not advertise;
▷ Player 2 chooses Do not advertise: Player 1 chooses Do not advertise.
Hence the option not to advertise is always the best strategy for Player 1. We want this to also be true for Player 2. So consider the best reply by this player for each strategy of Player 1:
▷ Player 1 chooses Advertise: Player 2 chooses Do not advertise;
▷ Player 1 chooses Do not advertise:
  – Player 2 chooses Advertise if $x < 2$;
  – Player 2 chooses Do not advertise if $x > 2$.
Therefore, the requirement that non-cooperation is the best option for each player allows us to conclude that $x > 2$. Moreover, since mutual cooperation has to be superior to mutual non-cooperation, the inequality $x < 5$ needs to be satisfied. Hence: $2 < x < 5$.

Problem 8

Answer: A player's plan of actions in a game.

Problem 9

Answer: Yes

Imagine Lufthansa enters the market. If British Airways doesn't start a price war, then its payoff is 200. On the other hand, if this company starts a price war, then its payoff is 300. Since this value is higher, British Airways has an incentive to start a price war if Lufthansa enters the UK market. Therefore, the threat is credible.

Problem 10

Answer: Sensodyne - Do not advertise

Consider the possible replies by Player 1 for each strategy of Player 2:
▷ Player 2 chooses Advertise:
  – Advertise is the best action;
  – Do not advertise is the worst action.
▷ Player 2 chooses Do not advertise:
  – Advertise is the best action;
  – Do not advertise is the worst action.
Therefore, for Player 1, Do not advertise is a dominated strategy.
Next, consider the possible replies by Player 2 for each strategy of Player 1:
▷ Player 1 chooses Advertise:
  – Advertise is the best action;
  – Do not advertise is the worst action.
▷ Player 1 chooses Do not advertise:
  – Do not advertise is the best action;
  – Advertise is the worst action.
Then, for Player 2, there is no dominated strategy. Consequently, the only correct answer is "Sensodyne - Do not advertise".