A. This game has following sub games and whole game is also a sub game.

1. Answer (c)
2. Answer (b)
3. There are four terminal histories in this game hence Answer (d)
4. Strategy (DG, E) implies that player 1 plays D in the beginning of the game and G in any subsequent move whereas player 2 plays E. Strategy (CH, E) implies that player 1 plays C in the beginning of the game and H in any subsequent move whereas player two plays E after the player 1 has already played his move
   Hence first strategy gives terminal history D whereas the second one gives (C, E, H)
   Hence Answer (b)
5. Following is the normal form representation of the game

<table>
<thead>
<tr>
<th></th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>1, 2</td>
<td>3, 1</td>
</tr>
<tr>
<td>CH</td>
<td>0, 0</td>
<td>3, 1</td>
</tr>
<tr>
<td>DG</td>
<td>2, 0</td>
<td>2, 0</td>
</tr>
<tr>
<td>DH</td>
<td>2, 0</td>
<td>2, 0</td>
</tr>
</tbody>
</table>

Game has three NEs: (CH, F), (DG, E) and (DH, E) hence Answer (C)
6. Only (DG, E) is subgame perfect. Answer (a)
7. (c)

B. In a Cournot duopoly setup, following is the firm’s maximization problem:

$$\max_{q_i} (9 - (q_i + q_{-i})) q_i - 2q_i.$$  \(1\)

The first order condition of problem (1) is

$$9 - 2q_i^* - q_{-i}^* - 2 = 0.$$ 

It follows that the first order conditions for the two firms are

$$9 - 2q_1^* - q_2^* - 2 = 0.$$ 

and

$$9 - 2q_2^* - q_1^* - 2 = 0.$$ 

From the first order condition, we get $$q_2^* = 7 - 2q_1^*.$$ We substitute this expression into the second order condition to get $$9 - 2(7 - 2q_1^*) - q_1^* - 2 = 0$$ or $$3q_1^* = 7,$$ so

$$q_1^* = \frac{7}{3}.$$ 

and

$$q_2^* = 7 - 2q_1^* = 7 - 2 \cdot \frac{7}{3} = \frac{7}{3}.$$ 

Not surprisingly, the quantities produced by firms 1 and 2 are equal. The total market output $$Q^* = 2 \cdot \frac{7}{3} = 14/3.$$
9. Answer (a)

In the Stackelberg case, firm 1 maximizes taking into account the reaction function of firm 2. The reaction function of firm 2 is \( q_2^*(q_1) = (7 - q_1)/2 \). Therefore, firm 1 maximizes

\[
\max_{q_1} \left( q_1 - \left( q_1 + \frac{7 - q_1}{2} \right) \right) q_1 - 2q_1
\]

which leads to the first order conditions

\[
9 - 2q_1 - 7/2 + q_1 - 2 = 0
\]

or

\[
q_1^* = 7/2
\]

and, using the reaction function of firm 2,

\[
q_2^* = \frac{7 - q_1^*}{2} = 7/4.
\]

C. This game has only one SPNE in which the first player divides the cake equally and the second player gets one of the two equal pieces. If player 1 instead divides the cake unequally, player 2 will opt for the bigger piece.

10. (a)
11. (c)

D. In an ultimatum game with indivisible units, each player has finitely many actions. As in the original ultimatum game, if player 2 accepts all offers, player 1 has best strategy to offer zero. If player 2 accepts all offers except zero, player 1 has best strategy to offer 1 cent.

Hence game has two SPNEs: 1) Player 1 offers 0 and player 2 accepts all offers and 2) player 1 offers 1 cent and player 2 accepts all offers but 0.

12. Answer (b)
13. Answer (b)

E. Following are the two representations of the game described in question:

14. (C, FG), (C, FH), (D, EG) are 3 NEs of this game. Hence Answer (d)

15. (C, FG) only SPNE of the game. Answer (a)