1. (a) The game is as follows (given the fact that players are selfish, greedy and risk neutral, we can take the sums of money as payoffs):

\[
\begin{array}{c|cc}
\text{Player 1} & W & N \\
\hline
W & Y/2 & X & 484 \\
N & 484 & Z & Z \\
\end{array}
\quad =
\begin{array}{c|cc}
\text{Player 2} & W & N \\
\hline
W & 900 & 1,225 & 484 \\
N & 484 & 1,225 & 1,764 \\
\end{array}
\]

(b) Neither player has a (weakly or strictly) dominant strategy.

(c) There are two pure-strategy Nash equilibria: \((W, W)\) and \((N, N)\). To find the mixed-strategy equilibrium let \(p\) be the probability with which Player 1 plays \(W\) and \(q\) the probability with which Player 2 plays \(W\). Then \(p\) and \(q\) must solve the following two equations:

\[
900q + 1,225(1 - q) = 484q + 1,764(1 - q) \quad \text{and} \quad 900p + 1,225(1 - p) = 484p + 1,764(1 - p)
\]

The solution is \(p = q = \frac{539}{955} = 0.5644\). Thus the mixed-strategy Nash equilibrium is

\[
\left( \frac{539}{955} \frac{416}{955} \right)
\]

(d) Replacing the amounts of money with utilities (using the utility function \(U(m) = \sqrt{m}\)) we get the following game:

\[
\begin{array}{c|cc}
\text{Player 2} & W & N \\
\hline
W & 30 & 35 & 22 \\
N & 22 & 35 & 42 \\
\end{array}
\]

Clearly, \((W, W)\) and \((N, N)\) are still Nash equilibria. To find the mixed-strategy equilibrium let \(p\) be the probability with which Player 1 plays \(W\) and \(q\) the probability with which Player 2 plays \(W\). Then \(p\) and \(q\) must solve the following two equations:

\[
30q + 35(1 - q) = 22q + 42(1 - q) \quad \text{and} \quad 30p + 35(1 - p) = 22p + 42(1 - p)
\]

The solution is \(p = q = \frac{7}{15} = 0.4667\). Thus the mixed-strategy Nash equilibrium is

\[
\left( \frac{7}{15} \frac{8}{15} \frac{7}{15} \frac{8}{15} \right)
\]

(e) At the mixed-strategy Nash equilibrium the probabilities are as follows, showing that a bank run is more likely when the two players are risk neutral.

\[
\begin{array}{c|c|c|c}
\text{Probability of No bank run} & \text{Probability of Bank run} \\
\hline
\text{both risk neutral} & \frac{416}{955} \times \frac{416}{955} = 0.1897 & 1 - 0.1897 = 0.8103 \\
\text{both risk averse} & \frac{8}{15} \times \frac{8}{15} = 0.2844 & 1 - 0.2844 = 0.7116 \\
\end{array}
\]
2. (a) One: the one that starts at player 2’s node.

(b) (b.1) Yes, because, given that players 2 and 3 don’t get to play, they cannot increase their payoffs by unilaterally changing their strategies; as for player 1, with G her payoff is 1.5 and if she played H instead her payoff would be lower, namely 0).

(b.2) No, because (A,F) is not a Nash equilibrium of the subgame (A is not a best reply to F).

(c.1) No, because player 3 could increase her expected payoff from 1 to 2 by switching from F to D. Alternatively, player 2 could increase his expected payoff from 0.5 to 1 by switching to B.

(c.2) No, because it is not even a Nash equilibrium.

(d) Player 1’s payoff is \( \frac{1}{2} 0 + \frac{1}{2} 9 = 4.5 \). Player 2’s payoff is \( \frac{1}{2} 0 + \frac{1}{2} 2 = 1 \). Player 3’s payoff is \( \frac{1}{2} 0 + \frac{1}{2} 0 = 0 \).

(e) First we have to solve the subgame, whose normal form is

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2, 1</td>
<td>2, 0</td>
<td>1, 2</td>
</tr>
<tr>
<td>B</td>
<td>1, 0</td>
<td>1, 2</td>
<td>2, 4</td>
</tr>
<tr>
<td>C</td>
<td>1, 4</td>
<td>0, 1</td>
<td>1, 2</td>
</tr>
</tbody>
</table>

There is only one Nash equilibrium, namely (B,F). Thus the game can be reduced to

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G gives player 1 an expected payoff of \( \frac{1}{2} 0 + \frac{1}{2} 3 = 1.5 \), while H gives an expected payoff of 2.5. Hence she will choose H. Thus the subgame-perfect equilibrium is (H,B,F).