1. You wish to buy a house. You have saved $20000 as a down payment. You need a loan to cover the remaining cost. Your monthly budget includes $2200 for mortgage payment. You would like to finish paying the debt in 30 years. Your bank charges 7.5% interest (this is the nominal annual rate), compounded monthly. What is the price of the costliest house you can afford?

2. When you turn 28 you start saving for retirement. At the beginning of each month you deposit $350 into an account which bears 5.5% interest (this is the nominal annual rate), compounded at the end of the month. When you retire, you stop depositing and start withdrawing $725 at the beginning of each month. The account must last until you turn 86. At what age (to the month) do you retire?

**Zero-sum games**

For each zero-sum matrix game below,

(a) find an optimal strategy for the row player.
(b) find an optimal strategy for the column player.
(c) state the value of the game.
(d) if the matrix has a saddle point, circle it. If not, write “no saddle point”.

3. \[
\begin{pmatrix}
-2 & -3 \\
2 & 1
\end{pmatrix}
\]

4. \[
\begin{pmatrix}
1 & 1 \\
1 & 4
\end{pmatrix}
\]

5. \[
\begin{pmatrix}
-1 & 3 \\
2 & -3
\end{pmatrix}
\]

6. \[
\begin{pmatrix}
2 & 1 \\
-1 & -2
\end{pmatrix}
\]

7. \[
\begin{pmatrix}
-2 & -3 & -3 \\
-1 & 2 & 1 \\
-2 & -4 & 7
\end{pmatrix}
\]

8. \[
\begin{pmatrix}
-1 & 2 & 3 & 2 \\
0 & 0 & -1 & 0 \\
1 & 1 & -2 & 2
\end{pmatrix}
\]