1. (10) Near Heinz Field (Pittsburgh, PA) there are two hotels, Steel Curtain and Stallworth Inn. If each hotel charges $100, then each hotel will earn a profit of $250. If one hotel charges $100 and the other charges $130, then the low priced hotel earns $500 and the high priced hotel earns $150. If both hotels charge $130, then each hotel earns $360.

a. Suppose each hotel must pick a price and maintain its chosen price for the remaining lifetime of the game. Draw a game tree for a single period and predict the outcome of the game.
b. Suppose the two hotels can change their prices daily and expect to be in business for three days. Steel Curtain announces that it will start with the high price and maintain it as long as Stallworth Inn does. If Stallworth Inn changes to a low price, then Steel Curtain will charge the low price for the remainder of the game (an example of a trigger strategy). Draw a game tree for this three day game and predict the outcome.

Since SI is only thin making a choice → SC 130, 130, 130 → 870
SI 130, 130, 100 → 1220
c. What would the outcome of this game be if it were only played for two periods?

\[
\begin{array}{cccc}
\text{SC} & \text{SI} \\
100 & 130 \\
130 & 130 \\
\end{array}
\]

\[
\begin{array}{cccc}
\text{SC} & \text{SI} \\
400 & 750 \\
650 & 650 \\
510 & 860 \\
720 & 720 \\
\end{array}
\]

SC → 130, 130 → 510
SI → 130, 100 → 860

d. What would the outcome be if it were played for one period?

\[
\begin{array}{cccc}
\text{SC} & \text{SI} \\
130 & 130 \\
\end{array}
\]

\[
\begin{array}{cccc}
\text{SC} & \text{SI} \\
150 & 500 \\
360 & 360 \\
\end{array}
\]
2. (4) Consider the following game. Firm 2 has two choices to make, the first is to decide whether to build a small plant or a large plant. The second decision is to produce a high or low amount of the product. Firm 1 has a single decision of whether to enter the industry. Suppose the following parentheses represent (Firm 2's plant size, Firm 1's entry decision, Firm 2's quantity choice, profit for Firm 1, profit for Firm 2). (Small, enter, high, 100, 350), (small, enter, low, 425, 425), (small, not enter, high, 0, 625), (small, not enter, low, 0, 525), (large, enter, high, 50, 275), (large, enter, low, 425, 175), (large, not enter, high, 0, 825), and (large, not enter, low, 0, 375).

a. Construct a game tree for this game.

b. Predict the outcome.

Small, enter, low 425, 425

(c. Suppose Firm 1 announces that it will "enter this market no matter what." Is this a credible threat? Explain.

Since firm 1 earns greater profits from entering versus not entering, this is a credible threat.
3. (6) Consider the following game. The cost structure of Firm 2 is unknown to Firm 1. Firm 1 places a probability of beta that Firm 2 is a high cost firm and 1-beta that Firm 2 is a low cost firm. Firm 1 makes a decision of whether to enter the market and Firm 2 decides whether to produce a high or low quantity. The following parentheses list the strategies and outcomes for the firms as (cost structure of Firm 2, Firm 1's entry decision, Firm 2's quantity choice). (High, enter, high, -350, 400), (high, enter, low, 275, 425), (high, not enter, high, 0, 700), (high, not enter, low, 0, 900), (low, enter, high, -350, 750), (low, enter, low, 385, 435), (low, not enter, high, 0, 1300), and (low, not enter, low, 0, 750).

a. Draw the extensive form of this game.

b. For what values of beta will firm one choose to enter the market?

\[
\begin{align*}
\text{Expected Profits} \\
\text{Enter} & & \text{Not Enter} \\
\beta(275) + (1-\beta)(-350) & & 0 \\
\beta & \geq \frac{350}{625}
\end{align*}
\]