Answer the following three problems. The questions have been written for you to reflect upon our discussions and readings. Be sure to compose your answers in the context of the textbook and article readings, and class lectures and discussion.

**Note.** Your answers should reflect your individual effort. Collaborating with others who are either enrolled in this class or not will lead to a failing grade. Answers showing close resemblance will be considered a collaborative effort.

**Guidelines**

1. The exam should reflect an individual’s effort, and NOT be the product of group collaboration. Points will be gained from the uniqueness of your response (provided your response is correct and/or can be substantiated).

2. Essays should be typewritten (double space, 12-point font, one-inch margins) and printed in letter or near-letter quality.

3. Although there is no lower limit to the number of pages, you are expected to demonstrate integrative and creative thought within the number you choose. However, an answer should not exceed five pages. Incorporating readings beyond the textbook into your response is greatly encouraged.

4. Be sure to cite the sources you reference. If the item (i.e., article, book, etc.) you reference is from the textbook, no bibliographic entry or footnote is required. Otherwise, attach an entry identifying the source.

5. Do NOT bind you exam answers. Staple each essay in the upper left corner and submit them in a 9 × 12-inch manila envelope.

6. Bullet points and non-descriptive paragraphs are not considered acceptable responses.
7. Be sure to organize your work. Unorganized submissions will be a detriment to your grade.

Refer to the syllabus for other requirements.

Problems

1. Using the decision tree in Figure 1, build an expert system that renders decisions for a commercial loan application in EXSYS. Carefully study the decision tree and implement a set of rules that accurately follows the decision making process. Be sure to include confidence (certainty) factors that reflect the outcomes displayed in the leaf nodes. (30 points)

The Data

The decision tree illustrated in Figure 1 represents the decision making process for a bank’s commercial loan application credit analysis. It was inductively built from 250 cases (using RPA). Of the 17 loan profile attributes (independent variables) collected for each case, the 6 most significant are listed below. The two outcome (dependent) variables are “accept” and “reject” (the loan application).

<table>
<thead>
<tr>
<th>Independent Variable Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACR</td>
<td>Applicant’s credit rating, 0 = neutral or favorable, 1 = negative</td>
</tr>
<tr>
<td>APR</td>
<td>Annual percentage rate</td>
</tr>
<tr>
<td>LVR</td>
<td>Loan-to-value ratio</td>
</tr>
<tr>
<td>NA</td>
<td>Neighborhood age</td>
</tr>
<tr>
<td>REL</td>
<td>Remaining economic life</td>
</tr>
<tr>
<td>TMPAIR</td>
<td>Total monthly payments to applicant’s income</td>
</tr>
</tbody>
</table>

Tangibles

For (1), submit the following items:

- 3½-inch diskette with your expert system application. Be sure to write your on your diskette.
- Printout of your rules.

2. Develop a multi-dimensional (i.e., three or more dimensions) framework that (a) describes the interactions of the features and characteristics, (b) distinguishes the differences, and (c) suggests the complementary nature of expert systems, CBR, neural networks, and genetic algorithms. What might
be the impacts of these systems on the organization? The framework should be based on factors discussed during class, and presented in your textbook. (40 points)

3. Using a two-outcome business classification problem (e.g., pay vs. do not pay, reject vs. accept, etc.) that you are familiar with, describe how the rule induction and AI techniques presented throughout the semester can be applied to it. In your discussion, describe the significance of the problem, identify the factors that must be evaluated and explain their significance, and explain how the techniques would be applied (implemented) and how they would improve the decision making process and quality of the decision. (30 points)

![Decision Tree](image-url)

**Figure 1.** Decision tree for commercial loan application decision making process