

**MAT120**

**PROJECTS 1, 2, 3**

**THE FOLLOWING PAGES CONTAIN THE 3 PROJECTS THAT ARE TO BE COMPLETED AS PART OF THE MAT 120 COURSE.**

**THE DUE DATES ARE NORMALLY THE CLASS THAT IS SPENT REVIEWING THAT SECTIONS CHAPTER TEST: SEE YOUR CURRENT SYLLABUS FOR THOSE DATES.**

**THESE DATES MAY BE SUBJECT TO CHANGE IF CLASS CANCELLATIONS, USUALLY DUE TO WEATHER, ARE NECESSARY. ANY CHANGES WILL BE ANNOUNCED IN CLASS.**

# MATH 120

## *Mathematics for the Liberal Arts*

### *Project 1 - Sets*

**Objective: To use survey data to explore different regions of three intersecting sets**

- You may work alone or with one or two other people from the class (No more than three people in a group). If you work with other people, you will hand in **one** project and each of you will receive the same grade, so be sure every member of the group contributes equally to the project.
- When you submit the project, use only one side of each piece of paper. The project should have a title sheet with the name of each person.
- The next page should contain the description of the problem and the five questions, neatly written. The last page should contain the solution – done on the computer or hand drawn and hand-written neatly.
- **If you hand in the project late, points will be deducted from your grade.**

#### **Method:**

1. Survey, interview, or hand out a questionnaire about a subject that interests you. The questionnaire should ask information about three different sets. Look at problems in Section 2.4 for some ideas.
2. Write down the total number you surveyed and figure the totals for all the possible overlaps of the three different sets. You should end up with eight regions in a Venn diagram.
3. Draw three overlapping sets, surrounding by the universal set,  $U$ . Label each set. Fill in the correct numbers for each region.
4. Construct five questions: the questions should all illustrate different types of set relationships with your survey information such as none, only..., A or B but not C, exactly two, A or B, etc.
5. Show your work and answer each question that you made up. Remember you have to show your work in order to receive the credit.

# MATH 120 –

## *PROJECT 2 – LOGIC*

**Objective: To use the ideas of logic to interpret a 'real world' claim.**

- You may work alone or with one or two other people from the class (No more than three people in a group). If you work with other people, you will hand in **one** project and each of you will receive the same grade, so be sure every member of the group contributes equally to the project.
- When you submit the project, **use only one side of each piece of paper**. The project should have a **title sheet with the name of each person**.
- **If you hand in the project late, points will be deducted from your grade.**

### **Method:**

1. Select one of the following that makes or implies a **conditional statement**. You should have three variables and also include a **conjunction** or **disjunction**.
  - a. an advertisement from a newspaper or magazine. (Include a copy to your project.)
  - b. an advertisement from TV or radio. (Copy the claim exactly as you heard it.)
  - c. a statement from a legal document or insurance policy. (Include a copy with the relevant section highlighted, or copy down the claim)
2. Write the statement in symbolic form. Clearly state what each symbol represents.
3. Create a truth table.
4. Pick **one row** in your truth table where the final truth value is **true**.
  - a. Translate the symbols back into English, using the truth values.
  - b. Analyze whether this situation might happen, and under what conditions. Explain why this situation might happen in real life.
5. Pick **one row** in your truth table where the final truth value is **false**.
  - a. Translate the symbols back into English, using the truth values.
  - b. Analyze whether this situation might happen, and under what conditions. Explain why this situation might happen in real life.
6. Explain whether you think any of the possibilities that show the company **lying**. (Where the value under the conditional is false) could actually happen.
7. In your own opinion, is the company's claim true? Explain clearly.

## EXAMPLE:

An advertisement in a magazine makes the following claim:

**"If you use Sunshine Face Lotion, then your skin will be radiant and will have no wrinkles."**

- a. Translate the statement to the symbolic form.

p: you use Sunshine Face Lotion.

q: your skin will be radiant.

r: your skin will have wrinkles.

- b. Create a truth table.

p	q	r	$\sim r$	$q \wedge r$	$p \rightarrow (q \wedge \sim r)$

- c. Pick one row in the truth table where the final truth value is **true**.
- For row 6, since p is false, q is true and r is false, then  $p \rightarrow (q \wedge \sim r)$  is true.
  - Analyze whether the situation might happen, and under what condition. Explain why this situation might happen in real life.
- d. Pick one row in the truth table where the final truth value is **false**.
- For row 4, since p is false, q is false and r is false, then  $p \rightarrow (q \wedge \sim r)$  is false.
  - Analyze whether the situation might happen, and under what condition. Explain why this situation might happen in real life.

# MATH 120

## *Mathematics for the Liberal Arts*

### *Project 3 – Numeration Systems*

**Objective: Explore various number systems and create your own number system.**

- You may work alone or with other people from the class. If you work with other people, you will hand in **one** project and each of you will receive the same grade, so be sure every member of the group contributes equally to the project.
- When you submit the project, use only one side of each piece of paper. The project should have a cover sheet with the name of each person.
- **If you hand in the project late, points will be deducted from your grade.**

#### **Method:**

Choose two numeration systems other than our normal Hindu-Arabic Numeration System. Ones to consider are Babylonian, Chinese, Egyptian, and Roman. Organize your answers to the following items by numeration system.

1. Using the Internet, your text and any other sources, write a description of each system. Tell the origins of the system and explain through examples the “rules” for the system. Tell when the system was used, why these people created or needed a numeration system, were calculations performed using the system and if so how, and any other interesting information. List the advantages and disadvantages of each system. Be sure to include a list of your references.
2. Show how you would write the current year and the year each group member was born using each number system. You may have duplicate birth years for your group.
3. Write a comparison of each system to the Hindu-Arabic System.
4. If you had to choose a numeration system other than the Hindu-Arabic System to use, which would you choose and why?
5. Create a numeration system of your own. Tell what its rules are and illustrate how to write numbers 1 to 100 using it. List the advantages and disadvantages of your sys

