Brandon Bardwell
Discrete Structures HW 1

Section 2.1 Number 3
Section 2.4, Number 5
Section 2.6, Number 3

I like to stay Discrete…(A+ for creativity?)

Sentence: (What we learned or noticed)

Problem 1: Section 2.1 Number 3
3. For each of these pairs of sets, determine whether the first is a subset of the second, the second is a subset of the first, or neither is a subset of the other.

> a) the set of airline flights from NewYork to New Delhi, the set of nonstop airline flights from New York to New Delhi
>
> b) the set of people who speak English, the set of people who speak Chinese
>
> c) the set of flying squirrels, the set of living creatures that can fly

Sentence:
For each of these pairs of sets, determine whether the first is a subset of the second, the second is a subset of the first, or neither is a subset of the other.

Look at a few real world examples, and help solidify our understanding of sets and subsets by talking about a few things we can visualize.

References:

Page 119 of pdf Section 2.1, Definition 3
Subsets
It is common to encounter situations where the elements of one set are also the elements of a second set. We now introduce some terminology and notation to express such relationships between sets.
DEFINITION 3 The set A is a subset of B if and only if every element of A is also an element of B.We use the notation $A \subseteq B$ to indicate that A is a subset of the set B

From wikipedia: https://en.wikipedia.org/wiki/Subset

In mathematics, a set *A* is a **subset** of a set *B*, or equivalently *B* is a **superset** of *A*, if *A* is contained in *B*. That is, all elements of *A* are also elements of *B*. *A* and *B* may be equal; if they are unequal, then *A* is a **proper subset** of *B*. The relationship of one set being a subset of another is called **inclusion** or sometimes **containment**. *A* is a subset of *B* may also be expressed as *B* includes *A*, or *A* is included in *B*.

The subset relation defines a partial order on sets. In fact, the subsets of a given set form a Boolean algebra under the subset relation, in which the meet and join are given by intersection and union.

Assumptions:
We can apply the mathematical definitions to the real world articles and the rules will not change.

Work:

a. There are many flights from New York to New Delhi. Only some of them are non-stop. So the non-stop flights are a subset of the other flights. (The second is a subset of the first, but the first is not a subset of the second)
b. One population speaks English. Another population speaks Chinese. Neither are a subset of the other. There is one subset that is speakers of both languages. This group is a subset of both.
c. Flying squirrels can't really fly. So they are not a subset of living creatures that can fly. And creatures that can fly are not a subset of flying squirrels. However, Ken says that flying squirrels can really fly, so the first is a subset of the second. However, we can all agree that even if squirrels can fly, that there are others that are not squirrels that can fly so the second is not a subset of the first.

Discussion:
We applied the definition from the book to three real world problems and came up with solutions that seem reasonable when we read them outloud. We looked for real world examples. We didn't find any. But the numeric examples from text book type problems also matched with our solutions. As a third check, we also referenced bob.

Problem 2: Section 2.4, Number 5

5. List the first 10 terms of each of these sequences.

a) the sequence that begins with 2 and in which each successive term is 3 more than the preceding term

b) the sequence that lists each positive integer three times, in increasing order

c) the sequence that lists the odd positive integers in increasing order, listing each odd integer twice

d) the sequence whose nth term is $n! - 2n$

e) the sequence that begins with 3, where each succeeding term is twice the preceding term

f) the sequence whose first term is 2, second term is 4, and each succeeding term is the sum of the two preceding terms

g) the sequence whose nth term is the number of bits in the binary expansion of the number n (defined in Section 4.2)

h) the sequence where the nth term is the number of letters in the English word for the index n

Sentence:

Try to use the section in the book to find the first 10 terms to each of the parts of the question.

References:

Page 156: Sequence Definition

DEFINITION 1 A sequence is a function from a subset of the set of integers (usually either the set {0,1,2,...} or the set {1,2,3,...}) to a set S.We use the notation an to denote the image of the integer n. We call an a term of the sequence.

N- First number in the set
N!- First number in the equation N!-XN

Assumptions:

These sets of numbers that we are asked to solve almost always follow a certain pattern.

Work:

a) 2, 5, 8, 11, 14, 17, 20, 23, 26, 29.
b) 1, 1, 1, 2, 2, 2, 3, 3, 3, 4.
c) 1, 1, 3, 3, 5, 5, 7, 7, 9, 9,
d) -1, -2, -2, 8, 88, 656, 4912, 40064, 362368, 3627776
e) 3, 6, 12, 24, 48, 96, 192, 384, 768, 1536.
f) 2, 4, 6, 10, 16, 26, 42, 68, 110, 178.
g) 1, 2, 2, 3, 3, 3, 3, 4, 4, 4.
h) 3, 3, 5, 4, 4, 3, 5, 5, 4, 3.

Discussion

Once the pattern is understood, the terms are easy to predict. I had to resort to BoB for question D and H, with everything else I was able to understand what it was asking.

Problem 3: Section 2.6, Number 3

3. Find AB

Sentence:

All I have to do is correctly multiply out the matrices

References:

Highschool algebra is my reference.

Assumptions:

This should be extremely easy if I remember it correctly.

Work:

a) $\begin{vmatrix} 1, 11 \\ 2, 18 \end{vmatrix}$

b) $\begin{vmatrix} 2, -2, -3 \\ 1, 0, 2 \\ 9, -4, 4 \end{vmatrix}$

c) $\begin{vmatrix} -4, 15, -4, 1 \\ -3, 10, 2, -3 \\ 0, 2, -8, 6 \\ 1, -8, 18, -13 \end{vmatrix}$

Discussion

In order to multiply Matrices, all you have to do is take the first matrix and multiply ever integer in the top row by every integer in the first column of the second matrix, and repeat.

P.S. For this assignment I used your template that you placed in the announcements folder and would like to know if you like the bolding and color coding and if I should continue doing assignments this way, I believe it makes it easier to read and understand.