

Group A

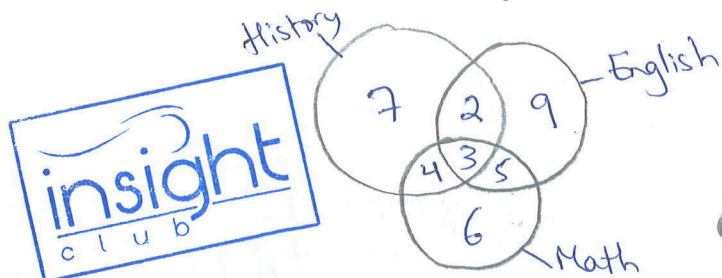
EDUC 271
Midterm Exam (35%)



Fall 2012
Time: 60 minutes

Name:

- a) According to a student survey, 16 students liked history, 19 students liked English, 18 liked mathematics, 8 liked mathematics and English, 5 liked history and English, 7 liked history and mathematics, 3 liked all three subjects, and every student liked at least one of the subjects. Draw a Venn diagram describing this information. (5pts)



- b) How many students were in the survey?

36 students ✓

- c) How many students liked only mathematics?

6 students ✓

- d) How many students liked English and mathematics but not history?

5 students ✓

1. Consider the following sequences: (5 pts)

First Sequence: 200, 500, 800, 1100, 1400, 1700, 2000, 2300, 2600

Second Sequence: 1, 3, 9, 27, 81, 243, 729, 2187, 6561



Identify each of these sequences as arithmetic or geometric. Justify.

- First: arithmetic since we are adding a constant (+300) each time
- Second: geometric since we are multiplying by 3 each time.

Suppose that the two sequences continue growing as listed above. Relative to their positions in each sequence, do you think that the terms in the first sequence will always be bigger than those in the second sequence? Justify. If no, determine the term and its position after which the terms in the second sequence become greater than the terms in the first sequence. Explain.

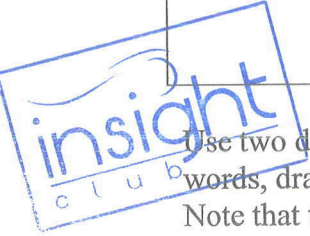
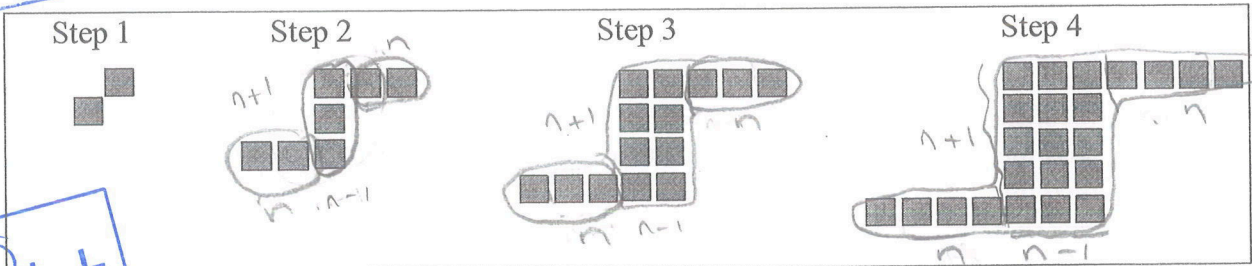
No, since the 2nd sequence is geometric (we are multiplying) which grows faster than adding (in the 1st sequence)

If we continue the sequences we can see that at the 9th term, sequence 2 will be greater than sequence 1.

8th term 2300 > 2187
9th term 2600 < 6561



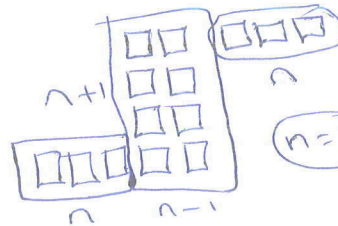
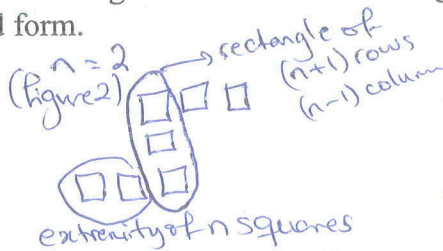
Figures 1, 2, 3 and 4 are the first steps in this pattern. The first figure consists of two tiles. For each new figure more tiles are added to form an S shape.



Use two different strategies to find the total number of tiles in figure n of the pattern. Use words, drawings and symbols to explain each of the two strategies. (/5 pts)

Note that the two strategies should lead to two algebraic expressions that are equivalent in their simplified form.

Strategy 1:



If we consider that for each n figure we have ~~$n+1$ rows~~ a rectangle of $(n+1)$ rows, $(n-1)$ columns, and 2 extremities of n squares each.

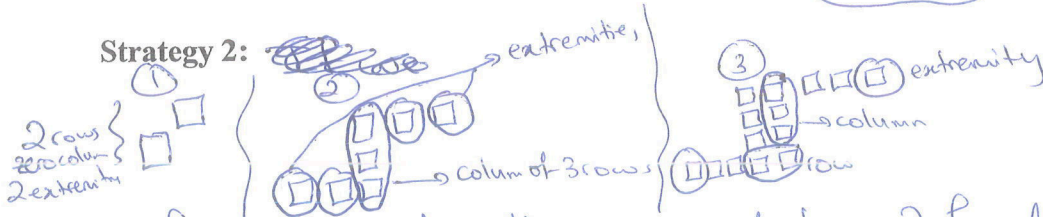
Total number of tiles in figure n is:

area of rectangle + 2x extremity

$$= (n+1)(n-1) + 2(n)$$

$$= n^2 - n + n - 1 + 2n = n^2 + 2n - 1$$

Strategy 2:



2 rows + 3 row
0 col + 1 col
2 ext + 2 ext

If we consider that step 1 has 2 fixed extremities, each step to another we are adding ~~a column and a square~~ a column of the same nb of rows, and a row, and a square to each extremity

in the n th figure: we will have $(n-1)$ columns of $(n-1)$ rows and $(n-1)$ each extremity

Total number = ~~$(n-1)(n-1) + 2(n-1)$~~

$$(n-1)(n+1) + 2 + 2(n-1)$$

$$= n^2 - n + n - 1 + 2 + 2n - 2$$

$$= n^2 + 2n - 1$$

Since in fig 1 we have 2 rows already and each time we add a row

since in figure one we had zero column and each time we add one column

3. The following is an example of one of the properties of multiplication of whole numbers. $3 \times 5 = 5 \times 3$. (/3 pts)

Identify the property illustrated in the above example.

Explain how a rectangular model can be used to illustrate this property.



4. Illustrate $18 \div 3 = 6$ using three different models (approaches). (/3 pts)

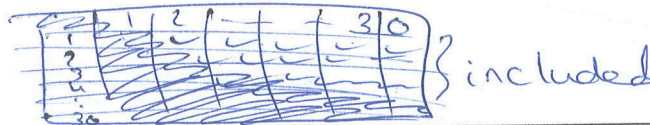


5. In a room with 30 people, everyone shakes hands with everybody else exactly once. How many handshakes are there? Use two strategies to find the answer. Explain. Note that you are not allowed to use any formula that was not addressed in the course. (/4 pts) $1 \rightarrow 30$

Strategy 1:

~~29~~ Since 30 doesn't shake with himself
 $29 + 28 + 27 + 26 + 25 + \dots + 1$

Strategy 2:



$$29 + 28 + 27 + 26 + \dots + 2 + 1 = 435$$

6. Consider the following set $\{2, 4, 6, 8, \dots, 2002\}$. (/5 pts)



a. Find the cardinal number of the set. Explain

$\frac{2002 - 2}{2} = \frac{2000}{2} = 1000$ since each number we add 2 to get the other so we are skipping a number so we have half the cardinal no of from ~~2~~ 2 to 2002 which is $2002 - 2 = 2000$

b. Find the sum $2+4+6+8+\dots+2002$. Explain.

$\frac{2002 + 2002 + \dots + 2002}{2}$
 $\frac{2004}{2} = 1002$
 $\frac{2002 - 2 + 1}{2} = 1001$
 $\rightarrow \frac{1001 \times 2004}{2} = 1003002$ ✓

7. In this problem you are going to use different algorithms to perform the following addition: $3567+5678$. (/5 pts)

a) The Lattice algorithm.

$\begin{array}{r} + 3567 \\ + 5678 \\ \hline 9245 \end{array}$

8	1	3	5
9	2	4	5

 ✓



b) Another algorithm.

scrach or standard

$\begin{array}{r} + 3567 \\ + 5678 \\ \hline 9245 \end{array}$ ✓



Good Luck