Math 141- Spring 2004 _____ Name:_____

Test I (chapters 1 and 2) 100

Show all your work!! Partial credit is based on work shown!! Seat:_____

6pts

1. Fill in the next two numbers for each sequence:

a. 6, 18, 54, 162, 486, _____, _____

b. 4, 10, 16, 22, 28, 34, _____, _____

c. 4, 16, 64, 256, 1024, _____, _____

8pts

2. For this sequence from problem 1b 4, 10, 16, 22, 28, 34, **. . .**

a. Describe the sequence **with words:**

b. Describe this sequence with a **formula** using n as the variable; that is, what is the formula that would generate the sequence if n = 1, then n = 2, etc.?

c. What is the 201st term of this sequence?

10pts

3. a. Pick any number and try the following "number magic".

	1st try	**2nd try**	**algebraic proof**
Pick a number			
Subtract 2			
Multiply by 4			
Add 14			
Subtract the original number			
Divide by 3			
(Show your result)			

b. What generalization can you make about <u>how the result is related to each number picked</u>?

c. Use algebra (in space **above)** to prove that your generalization is correct. _____

6pts

4. In chapter 1, we studied strategies for planning how to solve problems. List six of these strategies.

_____

30pts

14pts

5. **Solve** each of the following problems, **showing your reasoning and calculations**, then **list the problem solving strategies** (see problem #4 above) that you used.

a. How many cuts does it take to divide a log into:
six equal cross-sectional pieces?_____ seven equal cross-sectional pieces?_____

How many cuts does it take to divide a log into "n" equal cross-sectional pieces?_____

List the strategies you used:

b. There is an old riddle about a worm at the bottom of a 28-foot well. If the worm climbs up 4 feet each day and slips back 1 foot each night, how many days will it take him to climb out of the well?

List the strategies you used:

14pts

6. If A = {1, 2, 3, 4} and B = {4, 6, 8} and the universal set, U = {x | x ϵ whole numbers, 0 < x < 12} then:

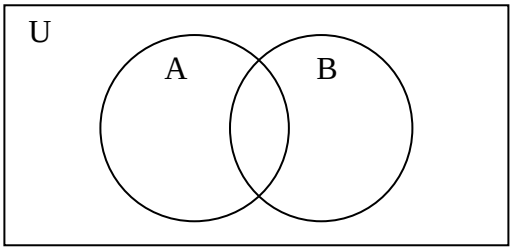
a. $A \cup B$ = _____

b. $A - B$ = _____

d. The Cartesian Product (A X B) has **how many** elements? _____

e. List **all** the subsets of set B:

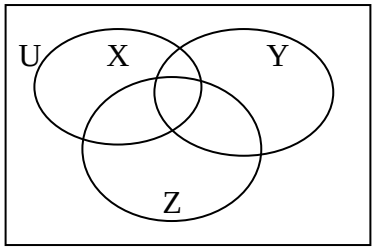
c. List the elements in the appropriate parts of this Venn Diagram for sets A, B and U:



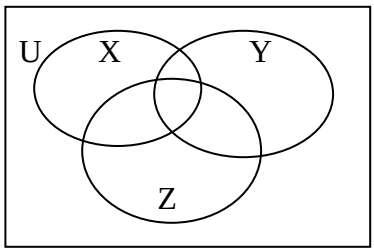
4pts

7. Shade this Venn diagram to represent the sets:

a. $\overline{(X \cap Y)}$



b. $[Z \cap \overline{(X \cap Y)}]$



_____
32pts

8pts

8. **True or False:** (If false, tell why it is false or correct the statement.)

a. _____ {1, 2, 3 } ~ {x, y, z}

b. _____ If X ⊂ Y, then X ∩ Y = Y.

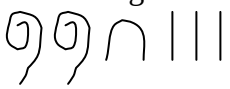
c. _____ If 8 ∈ {C ∩ D}, then 8 is in either set C or set D.

d. _____ A ∪ { } = { }

6pts

9. Write the usual Hindu-Arabic numeral for each of the following numerals:

a. MCDLXXVIII

b. 

6pts

10. Write 374 in each of the following number systems.

a. Babylonian

b. Mayan

6pts

11. a. 374_{ten} = _____ *six*

b. 312_{four} = _____ *ten*

4pts

12. If you are counting in base three, fill in the blanks to show what numbers would follow these:

1, 2, 10, 11, 12, 20, ____, ____, ____, ____, ____, _____, _____, _____

8pts

13. A particular function is the matching of a whole number with its multiple of 6. This could be expressed with the formula y = 6n. If the domain of the function is n ={1, 3, 5}, what is the range of the function? _____ Express this function in each of the following ways:

a. As an arrow diagram. (matching numbers in two sets)

b. As a set of ordered pairs

c. As a function machine

____

38pts