MATH 1060 Spring 2016
Exam 2

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DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

- Write your name below on the space provided.
- This test has a total of VI pages.
- Work the problem in the space provided. If you need more space, write on the back of the test.
- To insure maximum credit, show your work. In general, full credit will not be given for unsupported answers.
- Look only at your test. Don't give me the impression that you are cheating.
- Be sure to write neatly. If I cannot read what was written, do not expect the problem to be graded.
- If you finish early, go over the test again.

Good luck!

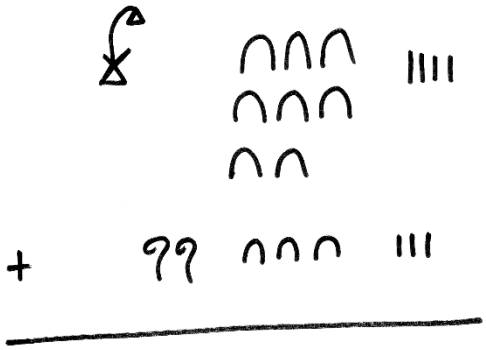
Number	Maximum	Score
1	12	
2	10	
3	10	
4	10	
5	4	
6	8	
7	8	
8	4	
9	4	
10	4	
11	20	
12	6	
Total	100	

Name _____

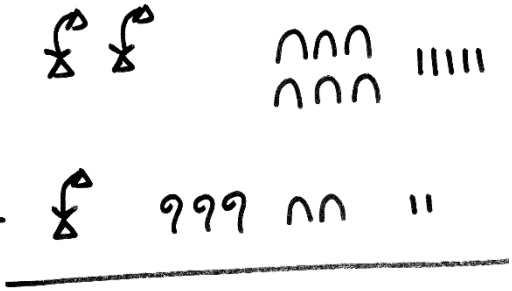
CIRCLE FINAL ANSWERS

1) (6 points each) Perform the indicated operation **showing all carrying and borrowing that are needed**. Convert only the answer to a Hindu-Arabic form. See the last page for the chart:

a)



b)



2) (5 points each) Write the Roman Number for the given numbers below:

a) 3,224

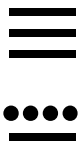
b) 2,123,901

3) (5 points each) Convert as directed:

a)  to Hindu-Arabic

b) 12,251 to Babylonian

4) (5 points each) Convert as directed:

a)  to Hindu-Arabic

b) 1,420 to Mayan

5) (2 points each) Write the given numbers in standard form:

a) $5\times10^3+7\times10^2+3\times10^1+9\times10^0$

b) $4\times10^3+6\times10^1+8\times10^0$

6) (4 points each) Using the expanded form numbers in 5*a* and 5*b* above, find the following. Be sure to show all carrying and borrowing that are necessary:

a) The sum

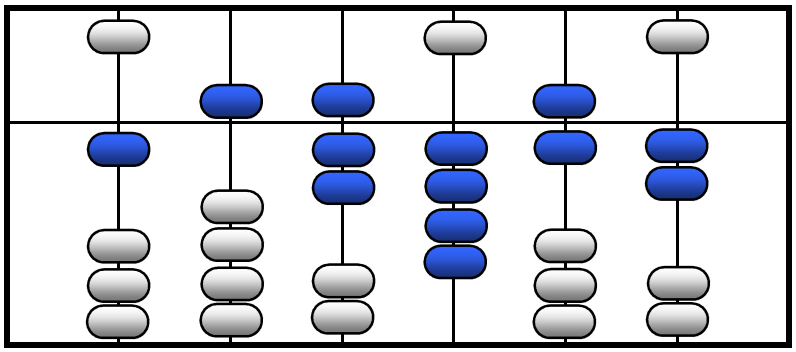
b) The difference

7) (4 points) Find the product of 70×105 using the method below:

a) Egyptian Multiplication

b) The Lattice Method

8) (4 points) Find the value below shown in the Japanese abacus:



9) (4 points) Write the first 12 counting numbers (starting with 1) in base 5:

10) (4 points) Count from $52D_{sixteen}$ to $536_{sixteen}$. You do not have to write the *sixteen* each time:

11) (5 points *a*, *b*; 10 points *c*) Convert the following numbers to the given base:
8) Convert the following numbers to the given base:
a) 514_{seven} to base 10 b) $2,330$ to base 8

c) 1412_{six} to base 9

12) (2 points each) Write the bases associated with each everyday object:
a) A pull-string lamp: b) A traffic light: c) A calendar:

13) (1 point each) Extra Credit: Match the event on the left with the item on the right:

_____ Built the first ruler	A. Numbers
_____ Did not use numbers in their language	B. Capitalism
_____ Invented the binary calculator to try to eliminate human error	C. Warlpiri Tribe
_____ The reason that Roman Numerals were no longer used as the universal number system	D. Fibonacci
_____ Credited with inventing the number zero	E. Egyptian
_____ Credited with bringing Hindu-Arabic numbers to the West	F. Archimedes
_____ Developed the mathematics necessary to turn a sphere into cylinder which helped modern mapmakers	G. Pythagoras
_____ Did not allow his followers to eat beans/Discovered that harmonies in music are combinations of whole numbers	H. Leibnitz
_____ The world's first writing	I. India

Table 1 Early Egyptian Symbols

Number	Symbol	Description
1		Stroke
10		Heel bone
100		Scroll
1000		Lotus flower
10,000		Pointing finger
100,000		Burbot fish
1,000,000		Astonished person

Table 2 Roman Symbols

Number	Symbol
1	I
5	V
10	X
50	L
100	C
500	D
1000	M

Special Features of the Babylonian System

1. Rather than using distinct symbols for each number less than the base (60), the Babylonians expressed face values in base 10 simple grouping, using only the two symbols

    for 10 and for 1.

   The system is, therefore, base 10 simple grouping *within* base 60 positional.
2. The earliest Babylonian system lacked a place holder symbol (zero), so missing powers of the base were difficult to express. Blank spaces within a numeral would be open to misinterpretation.

Table 5 Babylonian Symbols

Number	Symbol
1	
10	

Special Features of the Mayan System

1. Rather than using distinct symbols for each number less than the base (20), the Mayans expressed face values in base 5 simple grouping, using only the two symbols — for 5 and · for 1. The system is, therefore, base 5 simple grouping *within* base 20 positional.
2. Place values in base 20 would normally be

   $$1,\quad 20,\quad 20^2 = 400,\quad 20^3 = 8000,$$
   $$20^4 = 160{,}000,\quad \text{and so on.}$$

   However, the Mayans multiplied by 18 rather than 20 in just one case, so the place values are

   $$1,\quad 20,\quad 20 \cdot 18 = 360,\quad 360 \cdot 20 = 7200,$$
   $$7200 \cdot 20 = 144{,}000,\quad \text{and so on.}$$

Table 6 Mayan Symbols

Number	Symbol
0	
1	·
5	—