

Math 123-02  
Fall 2024  
Dr. Lily Yen

# Midterm One

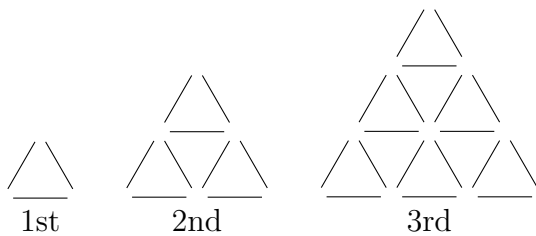
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Name: \_\_\_\_\_  
Number: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Score: \_\_\_\_/35

**Problem 1:** A total of 36 handshakes were exchanged at a CapU student union party. Each person shook hands exactly once with each of the others. How many people were present at the party? Hint: A table of values may help.

Score: /2

**Problem 2:** Shown are pictures of triangles formed by toothpicks: first with one triangle formed by 3 toothpicks; second with a big triangle of sides containing 2 toothpicks each; third with a bigger triangle of sides of length, 3 toothpicks each, and so on.



- Draw the fourth triangle.
- Find the number of toothpicks used in the fourth triangle by establishing the pattern from the first.
- Find a formula expressing the number of toothpicks used in the  $n$ -th triangle.

Score: /6

**Problem 3:** In a farm with chickens and horses (at least one of each), suppose you count a total of 22 legs, how many of each kind may be on the farm?

Suppose in addition, you count 20 eyes in total from the chickens and horses (still with 22 legs), how many of each kind do you have?

Score: /4

/12

**Problem 4:** For a project in one of Mei's courses, every student had to write a project proposal choosing three different topics out of 23 listed by the professor. The professor required that the proposed topics be listed in priority order: first, second, and third choice. How many different project proposals containing 3 topics are possible?

Score: /2

**Problem 5:** James and Candice just became friends with Beatrice, and they want to know when her birthday is. Beatrice gives them a list of ten possible dates:

- February 3 16
- March 15 24
- June 1 15 25
- September 1 16 24

Beatrice then tells James and Candice separately the month and the day of her birthday, respectively.

James: I don't know when Beatrice's birthday is, but I know that Candice doesn't know either.

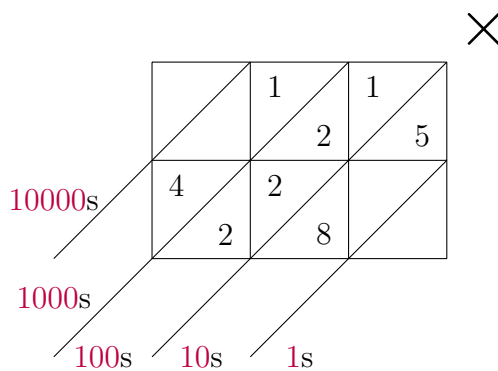
Candice: At first I didn't know when Beatrice's birthday is, but I know now.

James: I STILL DON'T know when Beatrice's birthday is.

What month is Beatrice's birthday in?


Score: /4

**Problem 6:** Determine the numbers around the galley to complete the multiplication.



Score: /4

**Problem 7:** Convert the following into Hindu-Arabic numerals base-10.

a. 

Score: /2

b. 

Score: /2

**Problem 8:** Convert the following Hindu-Arabic base-10 numerals into the stated numerals.

a. 1947 into Roman numerals.

Score: /2

b. 283 into octal (base-8).

Score: /2

c. 2968 into Mayan numerals.

Score: /2

**Problem 9:** Katherina bought a bag of Haribo gummy bears one day. When she grouped all the gummy bears into 25s, she had 4 gummy bears left over. When she grouped them into 20s, she had 9 left over. If her bag contained at least 100 gummy bears, what was the smallest possible number of gummy bears in her bag?

Score: /3