Midterm **TMath 171** Winter 2025

As a reminder, you are welcome to use a non-internet accessing calculator (which includes Desmos Test Mode) and one 1-sided 8.5 in by 11 in sheet of notes.

1. [6] Let a, b, and c be whole numbers. Are the following statement always true, sometimes true, or never true? Briefly justify your answer.

   (a) (ExtraPractice§3.2 #17)

   $$a - (b - c) = (a - b) - c$$

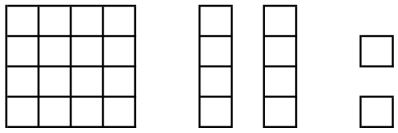
   (b) (Quiz3 #2)

   $$0 \times a = 0$$

2. [4] (ProblemSolvingActivity #5) A theater is set up in such a way that there are 14 seats in the first row and 4 additional seats in each consecutive row. The last row has 82 seats. How many seats are in the theater? Provide justification but you do NOT need to explain as you would to a 4th grader.

3. Consider the number in the base pieces below with 1 flat, 2 longs, and 2 units.

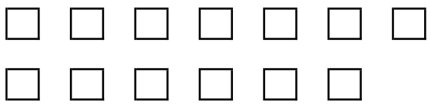
   (a) [2] (Quiz2#2) Write the number of units in positional notation for the given base.



   (b) [2] (NumberSystemActivity #3) Determine the total number of units, reporting in the Hindu-Arabic number system.

4. (§3.1 #12) Consider the number of units shown below.

   (a) [2] Sketch the minimum number of base pieces for base four to represent the set of units shown.

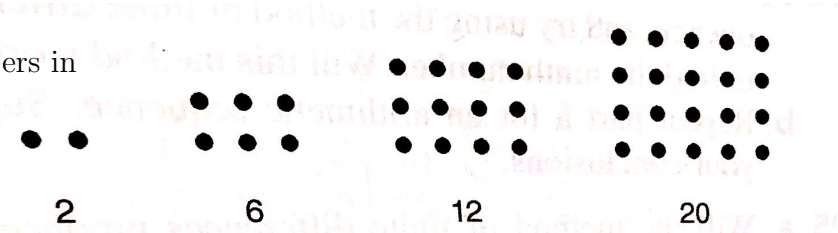


   (b) [1] Write the number of units in positional notation for base four.

5. [3] Which of the Egyptian, Roman, or Babylonian number systems is most like the one most used in the United States? Provide justification for your answer.

6. (§1.2 #31) Consider the sequence of numbers illustrated below.

   (a) [3] Find the next two numbers in the sequence.



   (b) [2] Identify if the sequence is recursive, arithmetic, geometric, or none of the above. Justify your answer.

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   (c) [2] Find the 50th number in the sequence.

7. Show work and compute (you do not need to explain it to a 4th grader):

   (a) [2] (Quiz3 #3) $213_{\text{six}} - 21_{\text{six}}$

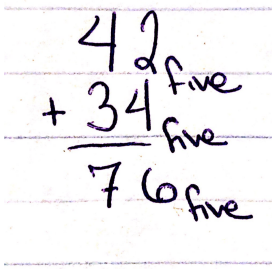
   (b) [2] (DivisionActivity #3) $112_{\text{five}} \div 4_{\text{five}}$

8. [3] Find a number that:

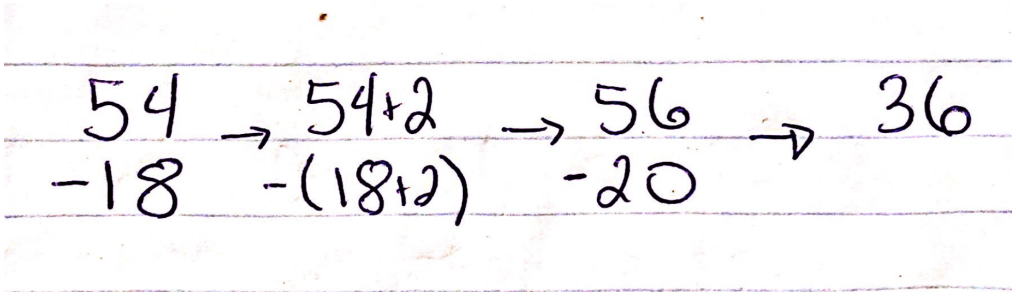
   - is not written in base 10,
   - has 2 digits, and
   - is made of more than 50 units.

9. Grade the work that follows. The work may be correct or incorrect. If correct, briefly justify why. If incorrect, find the error(s) & try to detect the reason for the error.

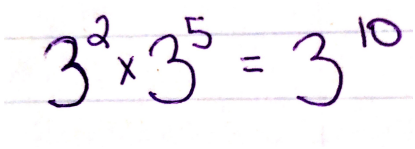
   (a) [3] (AddActivity #1)



   (b) [3] (§3.2 #25)



   (c) [3] (§3.4 #34)

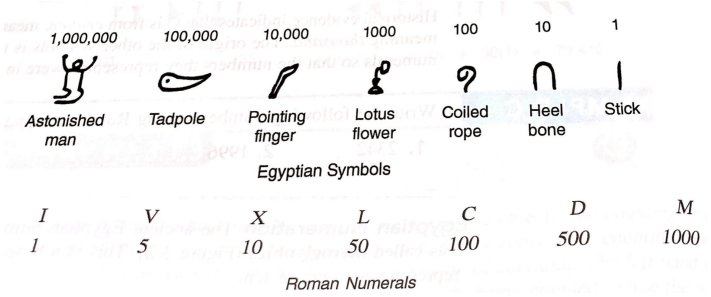


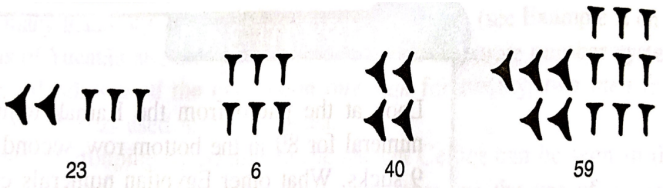
10. Consider $45 \div 3 \times 3 + 4$

    (a) [1] (Quiz3 #1) Circle the operation above that should be performed first:

    (b) [1] How would you modify the above expression to make it more clear the order of the operations?

11. [5] (§3.3 #6) Introduce how to multiply numbers as you would to an elementary school student who had forgotten. Use the example $123_{\text{five}} \times 4$ in the explanation.





Babylonian