Math 123-02
Spring 2026
Dr. Lily Yen

Quiz 1

Show all your work

Name: _____
Number: _____
Signature: _____
Score: ___/10

Problem 1: Mei has a 8 ft stick to saw into three pieces to stake her garden plants. Suppose the longest stick is as long as the combined length of the two shorter sticks, and the middle one is three times the shortest one, find the length of each stick.

Suppose the length of the shortest piece is x. Then the middle piece has length $3x$, and the longest piece has length $x + 3x = 4x$.
Therefore $x + 3x + 4x = 8\,\text{ft}$, so $8x = 8\,\text{ft}$, so $x = 1\,\text{ft}$. The three lengths are therefore

$$x = 1\,\text{ft}, \quad 3x = 3\,\text{ft}, \quad \text{and} \quad 4x = 4\,\text{ft}.$$

Score: /3

Problem 2: Anjali's family was invited to a friend's party. Suppose there were 3 families in total: 6 parents and 7 ($= 2+2+3$) children. If all the adults shook hands with one another except with their spouses and all the children shook hands except with their siblings, how many handshakes took place?

Adults' handshakes: $\frac{6\times4}{2} = 12$.
Children's handshakes: $\frac{2\times5+2\times5+3\times4}{2} = 16$.
Total $12 + 16 = 28$ handshakes.
Alternatively: All the adults could shake hands in $\frac{6\times5}{2} = 15$ ways. But the 3 handshakes between spouses do not happen, so only $15 - 3 = 12$ handshakes between adults.
Similarly, the children could shake hands in $\frac{7\times6}{2} = 21$ ways. Within each 2-child family, the siblings could shake hands in $\frac{2\times1}{2} = 1$ way. That's 2 handshake that does not happen.
Similarly, within the 3-child family, the siblings could shake hands in $\frac{3\times2}{2} = 3$ ways, so that's 3 handshakes that do not happen. So there is only $21 - 2 - 3 = 16$ handshakes between children.
Again, a total of $12 + 16 = 28$ handshakes.

Score: /4

Problem 3: Jimmy and Katharina just became friends with Beatrice, and they want to know when her birthday is. Beatrice gives them a list of ten possible dates:

February 9 14
April 3 15
June 15 24 27
September 3 14 24

Beatrice then tells Jimmy and Katharina separately the month and the day of her birthday, respectively.

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

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

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

Find the month Beatrice was born and explain why Jimmy still didn't know. Do you know when Beatrice's birthday is?

Katharina would know the birthday if the date is either the 9th or the 27th (since there is only one of each of those two days). But Jimmy knows that Katharina doesn't know the birthday, so he knows that the day isn't one of those; but the only way he could know that would be that the month is either April or September.
With this information, Katharina knows the birthday, so it cannot be the 3rd. However, Jimmy still doesn't know, so it must be either September 14th or 24th.

Score: /3