

Problem Set #3 – Eliminate Possibilities
This is a REQUIRED assignment – due October 14th.
Each problem is worth 12.5 points (8 correct problems = 100)

Instructions: Your solutions may be done by hand (in pencil) or on a computer. Your paper should be neat and easy-to-follow. Write or type out the important parts of the problem as well as your solution. You may include a cover sheet if you like, but it is not required. Lists and diagrams should be drawn or typed large enough to be easily interpreted.

1. *Three Brothers Go A-Courtin'* Three brothers each arranged to spend an evening with a woman that he had never met before. Each wanted to show off how charming he could be, so each formed a plan. By coincidence, each brother decided to buy a box of candy at the same store, and each bought tickets at the same ticket outlet. Andy bought honey-based candies because he wanted to show what a sweet guy he could be. Tony bought chews because he wanted to show that he was a choosy guy. Marty bought nuts. When it came time to leave, each brother grabbed the wrong candy box and ticket envelope. None of them took the candy or the tickets that belonged to him. Each took the tickets of one brother and the candy of the other. Andy didn't have Marty's candy. Who ended up with whose candy and whose tickets?
2. *Who is Lying?* Jim tells lies on Fridays, Saturdays, and Sundays. He tells the truth on all other days. Freda tells lies on Tuesdays, Wednesdays, and Thursdays. She tells the truth on all other days. If they both say, "Yesterday I lied," then what day is it today?
3. *The Letter From College* A father, much irritated by his undergraduate (and underperforming) son's frequently repeated demands for more money, rebelled and sent the following letter:

Dear Son,

If you won't do any work for your professors, maybe you will for me! At any rate, there will be no money forthcoming until you send me the solution to the following:

$$\begin{array}{r} S \ E \ N \ D \\ + \ M \ O \ R \ E \\ \hline M \ O \ N \ E \ Y \end{array}$$

As a hint, each letter represents a different digit (0 through 9).

Love,
Dad

What should the son's solution be?

4. *How Many Lines?* Sam counted the lines of a page in his book. Counting by threes gave a remainder of 2, counting by fives also gave a remainder of 2, and counting by sevens gave a remainder of 5. How many lines were on the page?
5. *Marbles in a Bag* If the marbles in a bag are removed two at a time, one marble will remain. If the marbles are removed three at a time, two marbles will remain. If the marbles are removed four, five, or six at a time, then three, four, and five marbles will remain, respectively. But if they are taken out seven at a time, no marbles will be left over. Find the least number of marbles that could be in the bag.
6. *Find the Number* If you multiply the four-digit number $abcd$ by 4, the order of the digits will be reversed. That is, $abcd \times 4 = dcba$. The digits $a, b, c,$ and d are all different. Find $abcd$.
7. *NELSON + CARSON = REWARD* A story from the Old West tells the tale of two famous outlaws named Nelson and Carson. The wanted poster calling for their arrest indicated that a substantial reward would be offered to the person who caught up to both of them and brought them in for trial. Amazingly, it turned out that the poster contained a great cryptarithm (word puzzle). All who saw the poster realized this and spent their time solving the puzzle rather than looking for Nelson and Carson! When Nelson and Carson heard all the ruckus about the poster, they also tried the problem. However, they weren't too bright and ended up visiting their local sherriff for a clue. He told them that $N = 5$, and then he arrested them. They solved the problem during the time they spent in jail. Each letter in the cryptarithm stands for a different digit (like problem #3). Find the digits that the other letters represent.
- | | | | | | | |
|---|-------|---|---|---|---|---|
| | N | E | L | S | O | N |
| + | C | A | R | S | O | N |
| | <hr/> | | | | | |
| | R | E | W | A | R | D |
8. *Rankings* Thuy (the tallest) is older than Miguel (the lightest). Jerel (the oldest) is shorter than Nick (the heaviest). No one has the same rank in any category. For example, if someone is the second tallest, he can't also be the second heaviest or the second oldest. Rank the four boys in each category: age, height, and weight.
9. *Ways to Score* The Cowboys score 18 points in a football game. In how many different ways can the 'Boys score these points? Points are scored as follows: a safety is 2 points, a field goal is 3 points, a touchdown is 6 points, a point after touchdown (PAT) is 1 point or 2 points (a PAT can't be scored unless a touchdown is scored first).

10. *High Scorers* The five starters for the Seaside Shooters scored all the team's points in the final basketball game of the season. Regina Reporter covered the game, but later her notes were accidentally destroyed. Fortunately she had recorded some interviews with the players, but when she played them back, only a few quotes seemed relevant to the scoring. She knew the final score was 95-94. Using the players' observations, determine how many points each of them scored.

Kellene: Everybody's totals were odd numbers.

Sara: Donna was fourth highest with 17 points. I scored 12 more points than Kellene.

Martina: Kellene and I scored a total of 30 points. I outscored her.

Heather: The last digit in everybody's score was different.

Donna: Our highest scorer had 25 points.