# Problem set #7

## Name:

Precalculus

Herbert H. Lehman High School

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The marketing department at **Jada$^2$ Inc.** has suggested that the company's trail mix products standardize on every mix being one-third peanuts. Adjusting the peanut portion of each recipe by also adjusting the chocolate portion leads to revised recipes, as given in the following table:

|  | Raisins kg/batch | Peanuts kg/batch | Chocolate kg/batch |
|---|---|---|---|
| Bulk | 7 | 5 | 3 |
| Standard | 6 | 5 | 4 |
| Fancy | 2 | 5 | 8 |
| Storage (kg) | 380 | 500 | 620 |

The production manager insists that enough of each mix should be made so that no ingredients are left over at the end of the day. **Your job is to write a report determining how much of each mix should be made, so that both the marketing department and the production manager are happy.** Use the questions below to guide your writing of the report.

1. (a) Write an $AX = B$ matrix equation to represent the information in the table, using $b$, $s$, and $f$ to represent the number of batches in the bulk, standard, and fancy mix.

   (b) Find the adjugate and determinant for A (feel free to use the calculators on Google Classroom!)

   (c) If possible, use the adjugate and determinant to find the inverse $A^{-1}$. If not, explain why you cannot find it in a complete sentence

   (d) What do you think this tells you about the problem you're trying to solve?

2. (a) Determine if your $AX = B$ matrix equation has one solution, no solution, or infinitely many solutions.

   (b) If possible, find **at least one solution** that works for $AX = B$ matrix equation

3. **write a paragraph responding to the marketing department's suggestion while also making the production manager happy**. Be sure to reference your findings from (1) and (2) to support your response!