Assignment 1

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I. "Jim must have figured out the cost of each food item. There's no other way to figure out his total check."

- *Reflection :*
  - Lets dissect this sentence. Because of Jim keen observations and linear algebra, he discovered that his order is representable as a linear combination of Gordon's and Masser's order with totals of 6.25 for Gordon, 8.45 for Masser, and 1.85 for Jim. Such as 3 times Gordons minus two times Masser's. The three of them ordered breakfast sandwiches, coffee, and donuts. But this doesn't mean he calculated the price of each item using the linear combination. The individual prices of the items ordered are not used as all in the calculation of Jim's total. So Jim, didn't figure out the cost of each item, and there is another way, linear algebra.

II. "There's no way the Jim could have figured out the costs of the individual items. There are three numbers (prices) to figure out and only two numbers given (the total checks for Masser and Gordon). You can't determine three unknown numbers given only two data numbers."

- *Reflection :*
  - Jim did not calculate the cost of each item. He used linear algebra. And even though there are 3 numbers to figure out, the totals for Gordon, Masser, and Jim, two of which are given (Gordon's and Masser's). Using only the given we *can* calculate Jims total. So this statement is completely false. we are given G + M and M + J. Therefore we can determine each of the following three quantities.

$$G + 2M + J,\ G - J,\ 2G + M - J$$

III. "If the three drivers had given different orders, Jim could have still figured out his total."

- *Reflection :*
  - This is a false statement. For example, if Gordon had ordered two donuts, three, cups of coffee, and one sandwich; Masser orders three donuts, two cups of coffee, and two sandwiches, and Jim orders two of each. Jim can not determine his bill from the totals of his friends.

IV. "There's something special about the particular orders that the three drivers put in. If they had made different choices it would perhaps be impossible for Jim to figure out his total check."

- *Reflection :*
  - Correct, there is something special about these particular orders that the driver placed at their stop. As I mentioned in Question 1, Jim's order is a linear combination of Gordons, and Masser's order. Meaning that these exist a finite number of order totals and scalars such that $J = s_1 \cdot G + s_2 \cdot M$, where the "$s_n$" represent scalars.