Assignment 3 Client Report:

Communication 1:

The most profit you could make is $1726.60. This is achievable by dedicating 3 display slots to Alaska, 3 display slots to Elsa and 2 display slots to Lumi. The answer is obtained by running the Profit(8,0) function which results in (1726.6, 3), meaning that you need to use 3 slots for Alaska. Running Profit(5,1) gives the answer (1150.1999999999998, 3) Which returns the profit you can make of selling the last two types and the number of fridges you should display for Elsa and eventually, Profit(2,2) returns the profit and the number of fridges for the last type Lumi (527.0, 2) which uses the last remaining two slots.

If you reduce the number of displays from 8 to 7, it dramatically decrease your profit, drop of nearly 117.9 dollars from 1726.60 to 1608.7 (run Profit(7,0) to get this answer). So this is not advisable. On the other hand, increasing the number of displays from 8 to 9 will result in a surge in the profit from $1726.6 to 1794.6. (run Profit(9,0) to get this result) . You could decide whether it is a good decision to make or not based on your strategies.

Communication 2:

The most profit you could make here is $4477.48. You could consider each fridge type separately, by running Profit2(0,0,0), Profit2(1,0,0) and Profit2(2,0,0) to get the results (1396.44, 5), (1514.2399999999998, 4) and (1566.8000000000002, 4) for the fridge types Alaska, Elsa and Lumi respectively. This shows the maximum profit for each fridge type and the number of fridges you should buy at the beginning for each fridge type respectively. Based on the actual number of sales, you could use the function for each fridge type by updating the warehouse number by subtracting the number of sold fridges from what you have ordered.

For each type of fridge, it doesn't matter if you already have then in stock in your warehouse, unless it is more than the number of fridges you would have potentially ordered. For example for Alaska, you need to order 5 fridges for week 1. If you have "f" number of fridges in stock, you could simply order 5 - "f" fridges. But if "f" is more than 5, it leads to a loss in profits, so it is important to keep the number of fridges at an optimal low number.

Communication 3:

The optimal profit is given by running the wrapper() function. Which is $3464.736
The buying strategy is the same as Communication2, as the only difference is the added truck delivery costs and warehouse limitations but they are not heavy enough to cancel out the prospective profit we could make from high sales. The wrapper() function also prints out all different outcomes for warehouse values and it shows if the number of fridges in the warehouse is high, the profit will be low so that constraint doesn't really affect our strategy (By increasing the warehouse capacity from 8 to 9, we didn't see any increase in profit. You could try it by increasing the dimension of warehouse vectors in profit_tab matrix and range for w1,w2,w3 in the loops for wrapper() function to see the result)

If we could increase the number of fridges we can deliver in each truckload, it would lead to an increase in profit. For example if instead of 7 fridges, we could deliver 8 fridges in each truck, the profit would have gone from $3464.736 to $3529.445.If we could deliver 10 fridges in each truckload, our profit would have gone up to $3684.4, but it would have also changed our ordering strategy from 5,4,4 in week one to 4,3,3 in week one, so that we could fit in all the orders of the week in one truck. Finally if it is not possible to increase the number of fridges delivered in each truck, but it is possible to get a 10% discount for delivery, our profit would have gone up to $3559.77, almost a $100 increase (you could do it by changing the return values of the Deliv function to your desired amount).

Thank you very much.