Investment advisory firm WJI manages over $120 million in funds. Their asset allocation model recommends the portions of each client’s portfolio to be invested in a growth stock fund, an income fund, and a money market fund. The firm caps the portion of each portfolio that may be invested in each of the funds. The amount invested in the growth fund must be between 20% and 40% of the portfolio value. Guidelines for the other two funds dictate that from 20% and 50% of portfolio value must be in the income fund with at least 30% of the total portfolio in the money market fund. Additionally, the company assesses the risk tolerance of each client and tweaks the portfolio.

A new client has $800,000 to invest. WJI assigned a maximum risk index of 0.05 for the client. Risk indicators show the risk of the growth fund to be 0.10, the income fund at 0.07, and that the money market fund is 0.01. Total portfolio risk index is the weighted average of the risk rating for the three funds, where the weights are the fraction invested in each of the funds.

WJI forecasts annual yields of 18% for the growth fund, 12.5% for the income fund, and 7.5% for the money market fund. Develop an LP model on the maximum yield for the portfolio.

1. How should the new advised allocate the $800,000 to the funds? What is the expected annual yield?

2. If the client’s risk index increased to 0.055, how much would yield increase and how would the investment recommendation change?

3. If instead, the client’s risk index were still 0.05, how would the recommendation change if the annual yield for the growth fund revised down to 16%, or even to 14%?

4. What is the effect if the amount invested in the growth fund is not allowed to exceed the amount invested in the income fund?