**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**ITOM 3306**

**OPERATIONS MANAGEMENT**

**Quiz**

Dr. Allen

The following problem is to be formulated as a linear programming problem. Some of the work has already been done. **Continue the formulation by writing the objective and the requested constraints.**

John Sweeney, an investment advisor, is attempting to allocate a portfolio of $500,000 for a client. John has narrowed down the decision and is considering five different investments which are summarized below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Investment | Projected Annual After Tax Return | Liquidity Factor | Risk Factor | Type of Investment |
| MM1 | 3% | 100 | 10 | Money market |
| T Bill | 1% | 80 | 0 | US Treasury Bill |
| Big Business Inc. | 5% | 100 | 40 | Stock |
| Small Guys Ltd. | 10% | 100 | 80 | Stock |
| Fairview Apartments | 18% | 0 | 50 | Real Estate |

John would like to find the allocation which maximizes the projected annual after tax return. His client requires a (weighted) average risk factor of at most 55. In addition, the (weighted) average liquidity factor must be at least 65. No more than 35% of the invested funds may be allocated to any one investment. At least $10,000 must be invested in the money market (MM1), and at least $10,000 must be placed in the T Bill account. At most $400,000 is to be invested in stocks.

***Different versions asked for different constraints. Here is the complete formulation.***

Decision Variables:

Let M = the amount of money to invest in MM1 Money Market

T = the amount of money to invest in T-Bills

B = the amount of money to invest in Big Business Inc.

S = the amount of money to invest in Small Guys Ltd.

F = the amount of money to invest in Fairview Apartments

Objective:

MAX projected annual after tax return = Z = .03M + .01T + .05B + .1S + .18F

Constraints:

(Funds to invest) M + T + B + S + F ≤ 500,000

(At most $400,000 in stocks) B + S ≤ 400,000

(At least $10,000 in T Bills) T ≥ 10,000

(At least $10,000 in Money Market) M ≥ 10,000

(35% limit on Fairview) F ≤ .35(M + T + B + S + F)

(35% limit on Small Guys) S ≤ .35(M + T + B + S + F)

(35% limit on Big Business) B ≤ .35(M + T + B + S + F)

(35% limit on T Bills) T ≤ .35(M + T + B + S + F)

(35% limit on Money Market) M ≤ .35(M + T + B + S + F)

(Liquidity) 100M + 80T + 100B + 100S ≥ 65(M + T + B + S + F)

(Risk) 10M + 40B + 80S + 50F ≤ 55(M + T + B + S + F)

(Non-negativity) M ≥ 0, T ≥ 0, B ≥ 0, S ≥ 0, F ≥ 0