Romans Food Market, located in Saratoga, New York, carries a variety of specialty foods from around the world. Two of the store’s leading products use the Romans Food Market name: Romans Regular Coffee and Romans DeCaf Coffee. These coffees are blends of Brazilian Natural and Colombian Mild coffee beans, which are purchased from a distributor located in New York City. Because Romans purchases large quantities, the coffee beans may be purchased on an as-needed basis for a price 10% higher than the market price the distributor pays for the beans. The current market price is $0.46 per pound for Brazilian Natural and $0.64 per pound for Colombian Mild. The compositions of each coffee blend are as follows:

|  |  |  |
| --- | --- | --- |
|  | **Blend** | |
| **Bean** | **Regular** | **DeCaf** |
| Brazilian Natural | 60% | 40% |
| Colombian Mild | 40% | 60% |

Romans sells the Regular blend for $3.1 per pound and the DeCaf blend for $4.3 per pound. Romans would like to place an order for the Brazilian and Colombian coffee beans that will enable the production of 1,050 pounds of Romans Regular coffee and 500 pounds of Romans DeCaf coffee. The production cost is $0.8 per pound for the Regular blend. Because of the extra steps required to produce DeCaf, the production cost for the DeCaf blend is $1.15 per pound. Packaging costs for both products are $0.25 per pound. Formulate a linear programming model that can be used to determine the pounds of Brazilian Natural and Colombian Mild that will maximize the total contribution to profit.

|  |  |
| --- | --- |
| Let | BR = pounds of Brazilian beans purchased to produce Regular |
|  | BD = pounds of Brazilian beans purchased to produce DeCaf |
|  | CR = pounds of Colombian beans purchased to produce Regular |
|  | CD = pounds of Colombian beans purchased to produce DeCaf |

If required, round your answers to four decimal places. For subtractive or negative numbers use a minus sign even if there is a + sign before the blank. (Example: -300)

The complete linear program is

Max \_\_\_ BR+BD\_\_\_+CR\_\_\_+CD\_\_\_

St

\_\_\_\_\_\_\_BR+\_\_\_\_\_\_\_\_\_\_\_CR=\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_BD+\_\_\_\_\_\_\_\_CD=\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_BR+\_\_\_\_\_\_\_\_\_\_\_CR=\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_BD+\_\_\_\_\_\_\_\_CD=\_\_\_\_\_\_\_\_\_

BR, BD, CR, CD ≥ 0

What is the contribution to profit?

Optimal solution:

BR =

BD =

CR =

CD =

Value of the optimal solution = $