**MP3 (50 pounds)** NAME Russell Taylor

Total\_\_\_\_**50/50**\_\_\_\_\_

**DOCUMENTATION** (5)

\_✓\_Introduction/synopsis/overview appropriately descriptive of problem, input/output discussed, assumptions described, variables described, and name of programmer noted

\_✓\_Internal- blocks described, strategies/algorithms non-standard procedures explained

\_✓\_Meaningful identifiers/ use of self-documenting code

**STYLE** (2)

\_✓\_Spacing/indentation/upper case-lower case letters enhanced readability by/highlighting or displaying the structure of the program, blocks easily identified

**STRUCTURE** (8) (program & data)

\_✓\_Made appropriate choices between double and integer variables and had accurate arithmetic in expressions or assignments (coercion)

\_✓\_Appropriate use of constants

\_✓\_Correct use of data file

\_✓\_Assignment statements easily interpreted

\_✓\_Correct use of if-then and if-then-else structures

\_✓\_Correct use of <, <= etc. && and || in logical expressions

\_✓\_Correct nesting of structures

**STRATEGY** (10)

\_✓\_Problem broken into appropriate blocks

\_✓\_The solution was reasonable/appropriate/efficient/ understandable with no redundant testing

**INPUT** (5)

\_✓\_Correct reading from file (EOF and while accurately used)

**OUTPUT** (20)

\_✓\_Accuracy - all requirements present and accurate

\_✓\_Data nicely presented/styled/described by well chosen use

of character strings and spacing

\_✓\_Copy of data file included

**Source File**

**#include** <iostream>

**using** **namespace** std;

/\* Name of programmer: Russell Taylor

\* Date: 5/15/2020

\* This program calculates the maximum profit for a real estate office.

\* The program prompts the user to enter the total number of units, the

\* rent that will keep all units occupied, the increase in rent that

\* results in a vacant unit, and the cost to maintain each rented unit.

\* The program assumes that the user inputs integer values that are correct.

\* The program outputs the maximum profit and how many units should be

\* rented in order to maximize the profit.

\*/

**int** **main** () {

//Declare variables for each input value

**int** units, rent, increase, maintenance;

//Declare variables for each calculated value

**int** profit, maxProfit, maxUnits;

//Prompt the user to input required information

cout << "Maximum Rental Profits by Russell Taylor" << endl;

cout << "\nEnter the total number of units: ";

cin >> units;

cout << "Enter the rent that will keep all units occupied: ";

cin >> rent;

cout << "Enter the increase in rent that results in a vacant unit: ";

cin >> increase;

cout << "Enter the cost to maintain each rented unit: ";

cin >> maintenance;

cout << endl;

//Record input values for units and rent, for use in calculations below

**int** totalUnits = units;

**int** initialRent = rent;

//Calculate and display profit for each number of units rented

**for** (**int** count = 0; count <= totalUnits; count++) {

units = totalUnits - count; //Increment number of rented units by -1

rent = initialRent + (increase \* count); //Increment rent by the amount input by user

profit = units \* (rent - maintenance); //Calculate profit

//Display number of rented units, monthly rent, total maintenance costs, and profit

cout << "Units: " << units;

cout << "\tRent: $" << rent;

cout << "\tMaintenance: $" << units \* maintenance;

cout << "\tProfit: $" << profit << endl;

// Calculate maximum profit and the number of units rented in order to maximize profit

**if** (maxProfit < profit) {

maxProfit = profit;

maxUnits = units;

}

}

//Display maximum profit and number of units rented to maximize profit

cout << "\nThe number of units that should be rented to maximize profit is " << maxUnits << endl;

cout << "The maximum profit is $" << maxProfit << endl;

**return** 0;

}

**Output**

Maximum Rental Profits by Russell Taylor

Enter the total number of units: 50

Enter the rent that will keep all units occupied: 600

Enter the increase in rent that results in a vacant unit: 40

Enter the cost to maintain each rented unit: 27

Units: 50 Rent: $600 Maintenance: $1350 Profit: $28650

Units: 49 Rent: $640 Maintenance: $1323 Profit: $30037

Units: 48 Rent: $680 Maintenance: $1296 Profit: $31344

Units: 47 Rent: $720 Maintenance: $1269 Profit: $32571

Units: 46 Rent: $760 Maintenance: $1242 Profit: $33718

Units: 45 Rent: $800 Maintenance: $1215 Profit: $34785

Units: 44 Rent: $840 Maintenance: $1188 Profit: $35772

Units: 43 Rent: $880 Maintenance: $1161 Profit: $36679

Units: 42 Rent: $920 Maintenance: $1134 Profit: $37506

Units: 41 Rent: $960 Maintenance: $1107 Profit: $38253

Units: 40 Rent: $1000 Maintenance: $1080 Profit: $38920

Units: 39 Rent: $1040 Maintenance: $1053 Profit: $39507

Units: 38 Rent: $1080 Maintenance: $1026 Profit: $40014

Units: 37 Rent: $1120 Maintenance: $999 Profit: $40441

Units: 36 Rent: $1160 Maintenance: $972 Profit: $40788

Units: 35 Rent: $1200 Maintenance: $945 Profit: $41055

Units: 34 Rent: $1240 Maintenance: $918 Profit: $41242

Units: 33 Rent: $1280 Maintenance: $891 Profit: $41349

Units: 32 Rent: $1320 Maintenance: $864 Profit: $41376

Units: 31 Rent: $1360 Maintenance: $837 Profit: $41323

Units: 30 Rent: $1400 Maintenance: $810 Profit: $41190

Units: 29 Rent: $1440 Maintenance: $783 Profit: $40977

Units: 28 Rent: $1480 Maintenance: $756 Profit: $40684

Units: 27 Rent: $1520 Maintenance: $729 Profit: $40311

Units: 26 Rent: $1560 Maintenance: $702 Profit: $39858

Units: 25 Rent: $1600 Maintenance: $675 Profit: $39325

Units: 24 Rent: $1640 Maintenance: $648 Profit: $38712

Units: 23 Rent: $1680 Maintenance: $621 Profit: $38019

Units: 22 Rent: $1720 Maintenance: $594 Profit: $37246

Units: 21 Rent: $1760 Maintenance: $567 Profit: $36393

Units: 20 Rent: $1800 Maintenance: $540 Profit: $35460

Units: 19 Rent: $1840 Maintenance: $513 Profit: $34447

Units: 18 Rent: $1880 Maintenance: $486 Profit: $33354

Units: 17 Rent: $1920 Maintenance: $459 Profit: $32181

Units: 16 Rent: $1960 Maintenance: $432 Profit: $30928

Units: 15 Rent: $2000 Maintenance: $405 Profit: $29595

Units: 14 Rent: $2040 Maintenance: $378 Profit: $28182

Units: 13 Rent: $2080 Maintenance: $351 Profit: $26689

Units: 12 Rent: $2120 Maintenance: $324 Profit: $25116

Units: 11 Rent: $2160 Maintenance: $297 Profit: $23463

Units: 10 Rent: $2200 Maintenance: $270 Profit: $21730

Units: 9 Rent: $2240 Maintenance: $243 Profit: $19917

Units: 8 Rent: $2280 Maintenance: $216 Profit: $18024

Units: 7 Rent: $2320 Maintenance: $189 Profit: $16051

Units: 6 Rent: $2360 Maintenance: $162 Profit: $13998

Units: 5 Rent: $2400 Maintenance: $135 Profit: $11865

Units: 4 Rent: $2440 Maintenance: $108 Profit: $9652

Units: 3 Rent: $2480 Maintenance: $81 Profit: $7359

Units: 2 Rent: $2520 Maintenance: $54 Profit: $4986

Units: 1 Rent: $2560 Maintenance: $27 Profit: $2533

Units: 0 Rent: $2600 Maintenance: $0 Profit: $0

The number of units that should be rented to maximize profit is 32

The maximum profit is $41376