Problem Set – Pass by Reference Functions. Create an IPO for each problem within this document. Save the document and upload to Blackboard for grading. Then create a C++ program for each problem. Upload the .CPP files to Blackboard for grading.

1. Allow the user to enter a quantity and price, use ctl+z to stop. Use one function to compute the total (quantity times price), tax (7% of total) and total order (total plus tax). The function should be passed the quantity and price by value and total, tax and total order by reference. Display total, tax and total order in main. Sum and display total of all orders and tax for all orders and display after the loop (all data is processed).

|  |  |  |
| --- | --- | --- |
| INPUT | PROCESS | OUTPUT |
| -quantity  - Price | Multiply quantity by price to get total  Calculate Tax as 7% of total  Add tax to total to get total order  Total and tax across all entries | Total for each order  Tax for each order  Total Order for each entry  Final total of all orders and total tax |

1. Enter the weight of a package and zip code. Use ctl+z to stop. Use a single function to do the computations specified next. Pass these weight and zip code by value, and pass postage, area charge and weight charge by reference. Compute postage to be sum of weight charge and area charge. Use tables below to find the charges. Compute weight charge to be weight x weight charge per ounce. Find the area charge in the table based on zip code. Then compute postage to be area charge plus weight charge. The function should return the weight charge, area charge and postage. Display area charge, weight charge and postage. Count and display the number of entries made.

**Area Table – Used to determine the area charge**

Area Area Charge

60171 $2.00

60172 $2.50

60635 $3.00

All others $5.00

**Weight Table – used to determine the weight charge**

Weight Weight Charge per Ounce

>100 0.02

>50 0.03

All other 0.05

|  |  |  |
| --- | --- | --- |
| INPUT | PROCESS | OUTPUT |
| Weight  Zip Code | Determine weight charge per ounce from weight table  Determine are charge from zip code table  Compute weight charge = weight x weight charge per ounce  Compute postage = area charge + weight charge  Count number of entries | Weight charge  Area charge  Postage  Display all charges  Total number of entries |

1. Enter the student’s last name, credit hours and financial aid, use ctl+z to stop. Pass credit hours and financial aid to a function by value. Pass tuition and tuition owed by reference. Compute tuition to be credit hours times $250. Compute tuition owed to be tuition minus the financial aid. Display student’s last name, tuition and tuition owed. Sum and display total tuition owed by all students, count of number of entries and average amount owed by students.

|  |  |  |
| --- | --- | --- |
| INPUT | PROCESS | OUTPUT |
| Students last name  Credit hours  Financial aid | Compute tuition = credit hours x 250  Compute tuition = tuition – financial aid  Accumulate total tuition owed and count entries  Compute average tuition owed after loop | Tuition  Tuition owed  Display name  Total |

1. Enter a number of widgets, use ctl+z to stop. Pass the number to a function by value, use ctl+z to stop. Use a single function to determine the cost per widget using the cost table below. Then compute extended price (number of widgets x cost per widget) and 7% sales tax. Finally compute total order to be extended price plus sales tax. Pass cost per widget, extended price, sales tax and total order by reference. For each line, display number of widgets, cost per widget, extended price, sales tax and total order. Sum all total orders and display when there is no more data to process.

**Cost Table**

Number of Widgets Cost Per Widget

10000 and up 4.00

5,000 and up 5.00

All other amounts 10.00

|  |  |  |
| --- | --- | --- |
| INPUT | PROCESS | OUTPUT |
| Number of widgets | Determine cost per widget using cost table  Extended Price = number x cost per widget  Sales tax = 7% of extended price  Total order = extended price + sales tax  Total of all orders | Cost per widget  Extended Price  Sales tax  Total order  Final total of all orders |

1. Enter the amount of investment, the 5 year interest rate and 10 year interest rate, use ctl+z to stop. Pass the amount and interest rates to a function by value. Pass variables representing five year amount and ten year amount to the same function by reference. Compute the five year amount and ten year amount using the formula below. Display the amount of the investment, the five year amount and the ten year amount.

Five year amount = amount of the investment x (1 + 5 year rate) raised to 5th power.

Ten year amount = amount of the investment x (1+10 year rate) raised to 10th power.

Note: Enter the 5 year rate and 10 year rate in decimal form, i,e 5% is entered as 0.05.

Also Note: you need to use the pow built in function. Recall the pow function syntax:

pow (base, exponent)

In this case, base is 1 + 5 year rate and exponent is 5.

Another line will be: base is 1 + 10 year rate and exponent is 10.

Use #include<math.h> for the pow function.

|  |  |  |
| --- | --- | --- |
| INPUT | PROCESS | OUTPUT |
| Investement Amount  5 year interest rate  10 year interest | 5 year amount = amount x pow(1 + 5 year rate )  10 year amount = amount x pow ( 1 + 10 year rate) | Five year amount  Ten year amount  Display investment |