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 |
| Function 1: Quantity, price, total, tax, tax total | Create function to return total, tax, and total+tax:  Total = quantity \* price tax = total \* 0.07 tax total = total + tax |  |
| Main: quantity, price, total, tax, tax total | Enter values for quantity and price |  |
| Tax sum, order sum | Create loop:  Function 1: to return values for total, tax, and tax toal  Order sum = order sum + total tax sum = tax sum + tax  Display total, tax, and tax+total End loop: | Total: TOTAL Tax: TAX order total: TAX TOTAL "Enter quantity and price per item (CTRL+ Z when done): " |
|  | Display order sum and tax sum | Order sum: ORDER SUM  Tax sum: TAX SUM |
|  |  |  |

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 |
| Functon1:  Weight. Zip code, area charge, weight charge, postage charge per ounce | Function to return area charge, weight charge, and postage:  if zip code = 60171, area charge = 2 if zip code = 60172, area charge = 2.5 if zip code = 60635, area charge = 3 if zip code is anything else, area charge = 5  if weight > 100, charge per ounce = .02 if weight > 50, charge per ounce = .03 if weight is <= 50, charge per ounce is .05 weight charge = weight \* charge per ounce  postage = weight charge \* charge per ounce |  |
| Main: zip code, weight area charge, weight charge, postage | Enter values for weight and zip code |  |
| entries | Start loop: Function 1: for area charge, weight charge, postage  Entries = entries + 1  display area charge, weight charge, and postage End loop: | Area charge : AREA CHARGE Weight charge: WEIGHT CHARGE Postage: POSTAGE  "Enter weight of package (oz) and zip code (CTRL+Z if done): " |
|  | Display entries | Entries: 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 |
| Function 1: credit hours, financial aid, tuition, tuition owed | Function to calculate tuition and tuition owed: tuition = credit hours \* 250 tuition owed = tuition – financial aid |  |
| Main: credit hours, financial aid, tuition owed, | Enter values for name, hours, and financial aid |  |
| Tuition sum, entries, average | Start loop: Function 1: return values for tuition and tuition owed  tuition sum = tuition sum + tuition owed entries = entries + 1  display name, tuition, tuition owed End loop: | Name: NAME  Tuition: TUITION  Tuition owed: TUITION OWED  "Enter surname (CTRL+Z if done): " |
|  | Average = tuition sum / entries  Display tuition sum, average, entries | Tuition sum: TUITION SUM average: AVERAGE Entries: ENTRIES |
|  |  |  |

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

|  |  |  |
| --- | --- | --- |
| Function 1: amount, cost, extended, tax, total, | Create function to return cost, extended price, tax, and total:  if amount >= 10000, cost = 4 if amount >= 5000, cost = 5 if amount less than 5000, cost = 10  extended = amount \* cost  tax = extended \* 0.07  total = extended + tax |  |
| Main: amount, cost, extended, tax, total | Enter value for amount |  |
| Total sum | Create loop: Function 1: to give values to cost, extended, tax and total  total sum = total sum + total  Display amount, cost, extended, tax and total  End loop: | Amount: AMOUNT Cost:COST  Extended: EXTENDED  Tax: TAX  Total: TOTAL  "Enter amount of widgets (CTRL+Z if done): " |
|  | Display total sum | Total sum: TOTAL SUM |
|  |  |  |
|  |  |  |

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 |
| Function 1: amount, 5 year rate, 10 year rate, 5 year return, 10 year return | Function to give investment returns:  5 year return = amount \* (1 + 5 year rate)^5 10 year return = amount \* (1 + 10 year rate)^10 |  |
| Main: amount, 5 year rate, 10 year rate, 5 year return, 10 year return | Enter values for amount, 5 year rate and 10 year rate |  |
|  | Start loop:  function 1: give values to 5 and 10 year returns  display 5 year return and 10 year return  End loop: | 5 year return: FIVE YEAR RETURN  10 year return: TEN YEAR RETURN  "Enter investment amount (CTRL+Z when done): " |
|  |  |  |
|  |  |  |