

MANDALAY TECHNOLOGICAL UNIVERSITY  
DEPARTMENT OF MECHATRONIC ENGINEERING  
**McE 21019 Computer System Architecture and Programming I**

Sr.No.	Solution	Mark
1. (a)	<p>What is the output of the following program segment?</p> <pre>int count = 1; while (++count &lt;= 5)     cout &lt;&lt; count * (count - 1) &lt;&lt; " "; cout &lt;&lt; endl;</pre> <p>Output is : 2 6 12 20</p>	5
1. (b)	<p>Rewrite the following expressions using the conditional operator.</p> <pre>if (hours &gt;= 40.0)     wages = 40 * 7.50 + 1.5 * 7.5 * (hours - 40); else     wages = hours * 7.50;</pre> <p>Answer is : wages=(hours&gt;=40.0)? (40 * 7.50 + 1.5 * 7.5 * (hours - 40 )): ( hours * 7.50;)</p>	5
1. (c)	<p>Suppose x, y, and z are int variables and w and t are double variables. What value is assigned to each of these variables after the last statement executes?</p> <pre>x = 20; y = 18; x = x + y / 4; z = x % 3 + 4.0; w = 57 / 3 + 6.5; t = x / 4.0 + 15 % 4 - 3.5;</pre> <p>Answer is : x = 24   y = 18   z = 4   w = 25.5   t = 5.5  </p>	5
1. (d)	<p>Write a program to find and display the sum and average of the successive integers 1, 2, 3, 4, 5, ... , 199, 200.</p> <pre>#include &lt;iostream&gt; #include &lt;conio&gt;  int main() {     int i,j;     double sum=0, avg=0;      for(i=1;i&lt;=200;i++)         sum=sum+i;      avg=sum/200.0;     cout&lt;&lt;"sum = "&lt;&lt;sum&lt;&lt;endl&lt;&lt;"avg = "&lt;&lt;avg&lt;&lt;endl;     getch();     return 0; }</pre>	5

2. (a)	<p>You found an exciting summer job for five weeks. It pays, say, \$15.50 per hour. Suppose that the total tax you pay on your summer job income is 14%. After paying the taxes, you spend 10% of your net income to buy new clothes and other accessories for the next school year and 1% to buy school supplies. After buying clothes and school supplies, you use 25% of the remaining money to buy savings bonds. For each dollar you spend to buy savings bonds, your parents spend \$0.50 to buy additional savings bonds for you. Write a program that prompts the user to enter the pay rate for an hour and the number of hours you worked each week. The program then outputs the following:</p> <ol style="list-style-type: none"> <li>Your income before and after taxes from your summer job.</li> <li>The money you spend on clothes and other accessories.</li> <li>The money you spend on school supplies.</li> <li>The money you spend to buy savings bonds.</li> <li>The money your parents spend to buy additional savings bonds for you.</li> </ol> <pre> #include&lt;iostream&gt; #include&lt;conio&gt; int main() {     double payrateperhour;     int numberofhour;     double income;     double totaltax;     double netincome;     double spendclothes;     double spendsupplies;     double remainingmoney;     double netspend;     double savingbonds;     double additionsavingbonds;     cout &lt;&lt; "Enter the pay rate for an hour:" ;     cin &gt;&gt; payrateperhour;     cout &lt;&lt; endl;     cout &lt;&lt; "Enter number of hour for each week:";     cin &gt;&gt; numberofhour;     cout &lt;&lt; endl;     income = 5 * payrateperhour * numberofhour;     cout &lt;&lt; "Income =" &lt;&lt; income &lt;&lt; endl;     totaltax = 0.14 * income ;     netincome = income - totaltax;     cout &lt;&lt; "Netincome =" &lt;&lt; netincome &lt;&lt; endl;     spendclothes = 0.1 * netincome;     cout &lt;&lt; "The money spend on clothes and other accessories :" &lt;&lt; spendclothes         &lt;&lt; endl;     spendsupplies = 0.01 * netincome;     cout &lt;&lt; "The money spend on school supplies=" &lt;&lt; spendsupplies &lt;&lt; endl;     netspend = spendclothes + spendsupplies ;     remainingmoney = netincome - netspend ;     savingbonds = 0.25 * remainingmoney;     cout &lt;&lt; "The money to buy saving bonds =" &lt;&lt; savingbonds &lt;&lt; endl;     additionsavingbonds = savingbonds * 0.5 ;     cout &lt;&lt; "The money parents spend to buy additionsavingbonds ="         &lt;&lt; additionsavingbonds &lt;&lt; endl;     getch();     return 0; } </pre>	10
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2. (b)	<div style="border: 1px solid black; padding: 10px; min-height: 400px;"><p>In a right triangle, the square of the length of one side is equal to the sum of the squares of the lengths of the other two sides. Write a program that prompts the user to enter the lengths of three sides of a triangle and then outputs a message indicating whether the triangle is a right triangle. Find and output the hypotenuse of the right triangle.</p><pre>#include &lt;iostream&gt; #include &lt;conio&gt;  int main() {     int len1,len2,len3,var1,var2,var3;      cout&lt;&lt;" Enter the lengths of the triangle : ";     cin&gt;&gt;len1&gt;&gt;len2&gt;&gt;len3;      var1=len1*len1;     var2=len2*len2;     var3=len3*len3;     if(var1==var2+var3)         cout&lt;&lt;"The triangle is right triangle.\nThe hypotenuse of right triangle is : "             &lt;&lt; len1 &lt;&lt;endl;     else if (var2==var1+var3)         cout&lt;&lt;"The triangle is right triangle.\nThe hypotenuse of right triangle is : "             &lt;&lt; len2 &lt;&lt;endl;     else if (var3==var1+var2)         cout&lt;&lt;"The triangle is right triangle.\nThe hypotenuse of right triangle is : "             &lt;&lt; len3 &lt;&lt;endl;     else         cout&lt;&lt;" The triangle is not right triangle."&lt;&lt;endl;      getch();     return 0; }</pre></div>	10																								
3.	<p>Suppose we are given a file consisting of students' names and their test scores, a number <b>between 0 and 100 (inclusive)</b>. Each line in the file consists of a student name followed by the test score. We want a program that outputs each student's name followed by the test score followed by the grade. The program also needs to output the average test score for the class.</p> <p>The grade consideration is</p> <p>If the test score is <math>0 \leq \text{test score} \leq 50</math>, grade is F.</p> <p>If the test score is <math>50 &lt; \text{test score} \leq 60</math>, grade is D.</p> <p>If the test score is <math>60 &lt; \text{test score} \leq 70</math>, grade is C.</p> <p>If the test score is <math>70 &lt; \text{test score} \leq 80</math>, grade is B.</p> <p>If the test score is <math>80 &lt; \text{test score} \leq 100</math>, grade is A.</p> <p>Inputfile name is <i>PE11inputData.txt</i> and outputfile name is <i>PE11outputData.txt</i>.</p> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div style="width: 45%;"><p>Inputfile sample format is:</p><table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="padding: 2px;">Steve Gill 89</td></tr><tr><td style="padding: 2px;">Rita Johnson 91.8</td></tr><tr><td style="padding: 2px;">Randy Brown 85.6</td></tr><tr><td style="padding: 2px;">Seema Arora 45.60</td></tr></table></div><div style="width: 45%;"><p>Outputfile sample format is:</p><table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="padding: 2px;">Steve</td><td style="padding: 2px;">Gill</td><td style="padding: 2px;">89.00</td><td style="padding: 2px;">B</td></tr><tr><td style="padding: 2px;">Rita</td><td style="padding: 2px;">Johnson</td><td style="padding: 2px;">91.80</td><td style="padding: 2px;">A</td></tr><tr><td style="padding: 2px;">Randy</td><td style="padding: 2px;">Brown</td><td style="padding: 2px;">85.60</td><td style="padding: 2px;">B</td></tr><tr><td style="padding: 2px;">Seema</td><td style="padding: 2px;">Arora</td><td style="padding: 2px;">45.60</td><td style="padding: 2px;">F</td></tr><tr><td colspan="4" style="padding: 5px;">Class Average: 78.00</td></tr></table></div></div>	Steve Gill 89	Rita Johnson 91.8	Randy Brown 85.6	Seema Arora 45.60	Steve	Gill	89.00	B	Rita	Johnson	91.80	A	Randy	Brown	85.60	B	Seema	Arora	45.60	F	Class Average: 78.00				20
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#include <iostream>
#include <conio>
#include <fstream>
#include <string>
#include <iomanip>
int main ()
{
    ifstream inFile;
    ofstream outFile;

    string firstName, lastName;
    char ch;
    double marks,sum=0,avg,count;

    inFile.open ("PE11inputData.txt");
    if(!inFile)
    {
        cout<<"Cannot Open the input file. The program terminates."<<endl;
        return 1;
    }
    outFile.open ("PE11output.txt");
    outFile.setf(ios::fixed);
    outFile<<setprecision(2);
    cout<<"Data Processing:"<<endl;

    inFile>>firstName>>lastName;
    inFile>>marks;
    do
    {
        sum=sum+marks;
        count++;
        if(marks<=50)
            outFile<<firstName<<"\t"<<lastName<<"\t"<<marks<<"\tF"<<endl;
        else if(marks<=60)
            outFile<<firstName<<"\t"<<lastName<<"\t"<<marks<<"\tD"<<endl;
        else if(marks<=70)
            outFile<<firstName<<"\t"<<lastName<<"\t"<<marks<<"\tC"<<endl;
        else if(marks<=80)
            outFile<<firstName<<"\t"<<lastName<<"\t"<<marks<<"\tB"<<endl;
        else
            outFile<<firstName<<"\t"<<lastName<<"\t"<<marks<<"\tA"<<endl;

        inFile>>firstName>>lastName;
        inFile>>marks;
    }while(inFile);
    avg=sum/count;
    outFile<<endl<<"\tClass Average : "<<avg;

    inFile.close();
    outFile.close();

    getch();
    return 0;
}

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4.	<p>The population of a town A is less than the population of town B. However, the population of town A is growing faster than the population of town B. Write a program that prompts the user to enter the population and growth rate of each town. The program outputs after how many years the population of town A will be greater than or equal to the population of town B and the populations of both the towns at that time. ( A sample input is: Population of town A =5000, growth rate of town A = 4%, population of town B = 8000, and growth rate of town B = 2% )</p> <pre> #include &lt;iostream&gt; #include &lt;conio&gt; int main( ) {     double popuA, popuB, popu_rateA, popu_rateB;     double totalpopuA, totalpopuB, year;     int A,B;      cout&lt;&lt;"Enter the small population of town A and big growth rate:";     cin&gt;&gt; popuA&gt;&gt;popu_rateA;     cout &lt;&lt; "Enter the big population of town B and small growth rate :";     cin&gt;&gt;popuB&gt;&gt;popu_rateB;      totalpopuA = popuA+(popuA*(popu_rateA/100));     totalpopuB = popuB+(popuB*(popu_rateB/100));     year = 1;      do     {         totalpopuA=totalpopuA+(totalpopuA*(popu_rateA/100));         totalpopuB=totalpopuB+(totalpopuB*(popu_rateB/100));         year++;     } while(totalpopuA &lt; totalpopuB);      A=static_cast&lt;int&gt; (totalpopuA);     B=static_cast&lt;int&gt; (totalpopuB);      cout&lt;&lt;"Total population of A:"&lt;&lt;A&lt;&lt;endl;     cout&lt;&lt;"Total population of B:"&lt;&lt;B&lt;&lt;endl;     cout&lt;&lt;"Year : "&lt;&lt;year&lt;&lt;endl;      getch( );     return 0; } </pre>	
5. (a)	<p>Write a program that prompts the user to input an integer between 0 and 35. If the number is less than or equal to 9, the program should output the number; otherwise, it should output a for 10, b for 11, c for 12 . . . and z for 35.</p> <pre> #include &lt;iostream&gt; #include &lt;conio&gt; int main( ) {     int num;     char ch; </pre>	10

	<pre> cout&lt;&lt;"Enter the integer between 0 to 35 : "; cin&gt;&gt;num; if (num &gt;= 10) {     ch = static_cast&lt;char&gt;(num+ 87);     cout&lt;&lt;"Output is : "&lt;&lt;ch; } else     cout&lt;&lt;"Output is : "&lt;&lt;num;      getch();     return 0; } </pre>	
5. (b)	<p>You moved your “character” around an imaginary landscape and discovered castle, sorcerers, treasure and so on, using text—not picture –for input and output. When the game starts, you find yourself on a barren moor. Write that game sample program. You can type north for ‘n’, south for ‘s’, east for ‘e’ and west for ‘w’. You can go one “unit” north, south, east, or west, while the program keeps track of where you are and reports yours position, which starts at coordinates (10, 10). We’ll bury some treasure at coordinates (7, 11) and see whether the player can find it.</p> <pre> #include &lt;iostream&gt; #include &lt;conio&gt; #include &lt;process.h&gt; int main( ) {     char dir = 'a';     int x = 10, y = 10;      while(dir!='r')     {         cout&lt;&lt;"nYour location is "&lt;&lt;x&lt;&lt;","&lt;&lt;y&lt;&lt;endl;         cout&lt;&lt;"nEnter direction (n,s,e,w): ";         dir = getche( );         switch(dir)         {             case 'n': y--; break;             case 's': y++; break;             case 'w': x--; break;             case 'e': x++; break;             case 'r': cout&lt;&lt;"nExit program:"; break;             default: cout&lt;&lt;"nTry again\n ";         }         if(x==7 &amp;&amp; y==11)         {             cout&lt;&lt;"nYou found the treasure !\n";         }     }     getch();     return 0; } </pre>	10