

10 Answers

10.1 Variables

Exc. 1

```
#include <iostream>
using namespace std;
void main()
{
    int iNo1, iNo2;
    cout << "Specify 2 numbers: ";
    cin >> iNo1 >> iNo2;
    cout << "You entered: " << iNo1 << " and " << iNo2 << endl;
}
```

Exc. 2

```
#include <iostream>
using namespace std;
void main()
{
    int iNo1, iNo2;
```

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```
    cout << "Specify 2 numbers: ";
    cin >> iNo1 >> iNo2;
    cout << "Total = " << iNo1 + iNo2 << endl;
}
```

Exc. 3

```
#include <iostream>
using namespace std;
void main()
{
    int iNo1, iNo2;
    cout << "Specify 2 numbers: ";
    cin >> iNo1 >> iNo2;
    cout << "Total = " << iNo1 + iNo2 << endl;
    cout << "Difference = " << iNo1 - iNo2 << endl;
    cout << "Product = " << iNo1 * iNo2 << endl;
    cout << "Quotient = " << (double)iNo1/iNo2 << endl;
}
```

Exc. 4

```
#include <iostream>
#include <iomanip>
using namespace std;
void main()
{
    double iNo1, iNo2, iNo3;
    cout << "Enter 3 decimal numbers: ";
    cin >> iNo1 >> iNo2 >> iNo3;
    cout << "Below are the entered numbers: " << endl;
    cout << setiosflags(ios::fixed) << setprecision(2);
    cout << setw(10) << iNo1 << endl;
    cout << setw(10) << iNo2 << endl;
    cout << setw(10) << iNo3 << endl;
}
```

Exc. 5

```
#include <iostream>
#include <iomanip>
using namespace std;
void main()
{
    //Declarations
```

```

int iNo;
double dUnitPr, dPriceExTax, dCustPrice, dTax, dTaxPerc,
      dDisc;

//Entry of quantity and unit price
cout<< "Specify quantity and unit price: ";
cin >> iNo >> dUnitPr;
//Entry of tax
cout << "Specify tax percent: ";
cin >> dTaxPerc;
//Calculations. First the price without tax
dPriceExTax = dUnitPr * iNo;
//Discount:
dDisc = dPriceExTax * 0.1;
dPriceExTax -= dDisc;
//then the tax amount
dTax = dPriceExTax * dTaxPerc / 100;
//and finally the customer price
dCustPrice = dPriceExTax + dTax;

//Output.
cout << endl << "INVOICE" << endl << "======" << endl;

```

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```

cout << "Quantity:" << setw(11) << iNo << endl;
cout << setprecision(2) << setiosflags(ios::fixed);
cout << "Price per unit:" << setw(8) << dUnitPr << endl;
cout << "Excl. tax: " << setw(12) << dPriceExTax << endl;
cout << "Discount:  " << setw(12) << dDisc << endl;
cout << "Total price:" << setw(11) << dCustPrice << endl;
cout << "Tax:" << setw(19) << dTax << endl;
}

```

Exc. 6

```

#include <iostream>
#include <iomanip>
using namespace std;
void main()
{
    //Declarations
    double dNoOfLit, dLitPrice, dTotal;

    //Entry of quantity and unit price
    cout<< "Enter no. of litres and price per litre: ";
    cin >> dNoOfLit >> dLitPrice;

    //Calculations. First the price excl tax
    dTotal = dNoOfLit * dLitPrice;

    //Printout
    cout << endl << "          RECEIPT" << endl;
    cout << setprecision(2) << setiosflags(ios::fixed);
    cout << "Volume:      " << setw(9) << dNoOfLit << " l" <<
        endl;
    cout << "Lit.price: " << setw(9) << dLitPrice << " kr/l"
        <<endl;
    cout << "To be paid:" << setw(9) << dTotal << " kr" <<
        endl;
}

```

Exc. 7

```

#include <iostream>
using namespace std;
void main()
{
    double dPrev, dCur, dPricekwh, dTotal;

```

```

    cout << "Enter current meter value: ";
    cin >> dCur;
    cout << "Enter previous meter value: ";
    cin >> dPrev;
    cout << "Enter price per kWh: ";
    cin >> dPricekwh;
    dTotal = (dCur-dPrev)*dPricekwh;
    cout << "Electricity charge: " << dTotal << endl;
}

```

Exc. 8

```

#include <iostream>
using namespace std;
void main()
{
    int t1, t2, t3, t4, t5;
    cout << "Specify 5 numbers: ";
    cin >> t1 >> t2 >> t3 >> t4 >> t5;
    cout << "Sum = " << t1 + t2 + t3 + t4 + t5 << endl;
    cout << "Average = " << (double)(t1 + t2 + t3 + t4 +
        t5)/5 << endl;
    cout << "Sum of squares ="<<t1*t1+t2*t2+t3*t3
        +t4*t4+t5*t5<<endl;
    cout << "Sum of cubes = " << t1*t1*t1 + t2*t2*t2 +
        t3*t3*t3 + t4*t4*t4 + t5*t5*t5 << endl;
}

```

Exc. 9

```

#include <iostream>
using namespace std;
void main()
{
    int iNo;
    cout << "Enter a number: ";
    cin >> iNo;
    cout << iNo/3 << " and remainder " << iNo%3 << endl;
}

```

Exc. 10

```

#include <iostream>
using namespace std;
void main()

```

```

{
    double dTempC, dTempF;
    cout << "Enter temperature in Celsius: ";
    cin >> dTempC;
    dTempF = 1.8 * dTempC + 32;
    cout << "Corresponding temperature in Fahrenheit is " <<
        dTempF << endl;
}

```

Exc. 11

```

#include <iostream>
using namespace std;
void main()
{
    //Declarations
    int iNoOfMin, iMinLeft, iNoOfHours;

    //Entry of minutes to be converted
    cout << "Enter number of minutes: ";
    cin >> iNoOfMin;

    //Calculate whole hours:

```

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```

iNoOfHours = iNoOfMin / 60;
//and number of minutes left:
iMinLeft = iNoOfMin % 60;

//Printout
cout << "No. of hours = " << iNoOfHours << endl;
cout << "No. of minutes = " << iMinLeft << endl;
}

```

Exc. 12

```

#include <iostream>
using namespace std;
void main()
{
    //Declarations
    int iNoOfDays, iDaysLeft, iNoOfMon, iMonLeft, iNoOfYears;

    //Entry of number of days to be converted
    cout << "Enter number of days: ";
    cin >> iNoOfDays;

    //Calculate whole months:
    iNoOfMon = iNoOfDays / 30;
    //and number of days left:
    iDaysLeft = iNoOfDays % 30;
    //Similarly with years:
    iNoOfYears = iNoOfMon / 12;
    iMonLeft = iNoOfMon % 12;

    //Printout
    cout << "No. of years = " << iNoOfYears << endl;
    cout << "No. of months = " << iMonLeft << endl;
    cout << "No. of days = " << iDaysLeft << endl;
}

```

Exc. 13

```

#include <iostream>
using namespace std;
void main()
{
    double s, v, t;    //distance, velocity, time
    cout << "Enter distance in km and velocity in km/h: ";
}

```

```
    cin >> s >> v;
    t = s/v;
    cout << "The trip takes " << t << " hours" << endl;
}
```

Exc. 14

```
#include <iostream>
using namespace std;
void main()
{
    double s, v, t;    // distance, velocity, time
    cout << "Enter distance in km and time in hours: ";
    cin >> s >> t;
    v = s/t;
    cout << "You must drive with " << v << " km/h" << endl;
}
```

Exc. 15

```
#include <iostream>
using namespace std;
void main()
{
    double s, v, t;    // distance, velocity, time
    cout << "Enter average speed in km/h and time in hours: ";
    cin >> v >> t;
    s = t*v;
    cout << "The distance is " << s << " km" << endl;
}
```

Exc. 16

```
#include <iostream>
using namespace std;
void main()
{
    int iOre,iOreLeft,iOre50,iOre50Left,iKr,iKrLeft,iKr5,
        iKr5Left,iKr10,iKr10Left,iKr20,iKr50,iKr50Left,iKr100;
    cout << "Enter number of Swedish ore: ";
    cin >> iOre;

    iOre50 = iOre/50;
    iOreLeft = iOre%50;
    iKr = iOre50/2;
```



```
iOre50Left = iOre50%2;
iKr5 = iKr/5;
iKrLeft = iKr%5;
iKr10 = iKr5/2;
iKr5Left = iKr5%2;
//Take 50kr values before 20, since 20 is not possible
//to evenly divide in 50
iKr50 = iKr10/5;
iKr10Left = iKr10%5;
iKr20 = iKr10Left / 2;
iKr10Left -= (iKr20 * 2);
iKr100 = iKr50/2;
iKr50Left = iKr50%2;

cout << "No. of 100 kr notes = " << iKr100 << endl;
cout << "No. of 50 kr notes = " << iKr50Left << endl;
cout << "No. of 20 kr notes = " << iKr20 << endl;
cout << "No. of 10 kr coins = " << iKr10Left << endl;
cout << "No. of 5 kr coins = " << iKr5Left << endl;
cout << "No. of 1 kr coins = " << iKrLeft << endl;
cout << "No. of 50 ore coins = " << iOre50Left << endl;
cout << "No. of ore = " << iOreLeft << endl;
}
```

Exc. 17

```

#include <iostream>
using namespace std;
void main()
{
    double dLen, dWidth, dHeight, dSpace, dFenceLen,
           dNoOfSticks, dTotMeters;
    cout << "Enter length and width of the field: ";
    cin >> dLen >> dWidth;
    cout << "Enter face height and space between boards
           in m: ";
    cin >> dHeight >> dSpace;
    dFenceLen = dLen * 2 + dWidth * 2;
    //Each board takes its width 0.10 + one space
    dNoOfSticks = dFenceLen / (0.10 + dSpace);
    dTotMeters = dNoOfSticks * dHeight;
    cout << "Total board length = " << dTotMeters << endl;
}

```

Exc. 18

```

//Before the last cout statement:
dTotMeters /= 0.9;

```

Exc. 19

```

//In the beginning of the program:
double dMeterPrice;
cout << "Enter price per meter: ";
cin >> dMeterPrice;
//After the last cout statement:
cout << "Price = " << dTotMeters * dMeterPrice <<
       " kr"<<endl;

```

Exc. 20

```

#include <iostream>
#include <iomanip> //for formatting of printouts
#include <stdlib.h> //for random numbers
#include <time.h> //for system clock
using namespace std;
void main()
{

```

```

//Declarations
int iRoll1, iRoll2, iRoll3, iRoll4, iRoll5;
double dAvg;
const int iNo = 5;
//Initiate random number generator
srand(time(0));
//Roll 5 times
iRoll1 = rand()%6+1;
iRoll2 = rand()%6+1;
iRoll3 = rand()%6+1;
iRoll4 = rand()%6+1;
iRoll5 = rand()%6+1;
//Calculate average
dAvg = (double)( iRoll1+ iRoll2+ iRoll3+ iRoll4+ iRoll5) /
        iNo;
//Printout
cout << "No. of rolls: " << iNo << endl;
cout << setprecision(1) << setiosflags(ios::fixed);
cout << "Average score: " << dAvg << endl;
cout << "Roll scores: " << iRoll1 << iRoll2 << iRoll3 <<
        iRoll4 << iRoll5;
}

```

Exc. 21

```

#include <iostream>
#include <stdlib.h> //for random numbers
#include <time.h> //for system clock
using namespace std;
void main()
{
    //Declarations
    int iRoll11, iRoll21, iRoll31, iRoll41, iRoll51;
    int iRoll12, iRoll22, iRoll32, iRoll42, iRoll52;
    //Initiate radom number generator
    srand(time(0));
    //Roll 5 times
    iRoll11 = rand()%6+1;
    iRoll21 = rand()%6+1;
    iRoll31 = rand()%6+1;
    iRoll41 = rand()%6+1;
    iRoll51 = rand()%6+1;
    iRoll12 = rand()%6+1;

```

```

iRoll22 = rand()%6+1;
iRoll32 = rand()%6+1;
iRoll42 = rand()%6+1;
iRoll52 = rand()%6+1;
//Printout
cout << "The double rolls are: " <<endl<<
        iRoll11+iRoll12<<endl<<iRoll21+iRoll22<<endl<<
        iRoll31+iRoll32<<endl<<iRoll41+iRoll42<<endl<<
        iRoll51+iRoll52<<endl;
}

```

Exc. 22

```

#include <iostream>
#include <stdlib.h>    //for random numbers
#include <time.h>     //for system clock
using namespace std;
void main()
{
    int L1, L2, L3, L4, L5, L6, L7;
    srand(time(0));
    L1 = rand()%35+1;
    L2 = rand()%35+1;

```

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```

L3 = rand()%35+1;
L4 = rand()%35+1;
L5 = rand()%35+1;
L6 = rand()%35+1;
L7 = rand()%35+1;
cout << "The Lotto scores are: " <<endl
      <<L1<<endl<<L2<<endl<<L3<<endl<<L4<<endl
      <<L5<<endl<<L6<<endl<<L7<<endl;
}

```

Exc. 23

```

#include <iostream>
#include <stdlib.h>      //for random numbers
#include <time.h>       //for system clock
using namespace std;
void main()
{
    double t1, t2, t3, t4, t5;
    srand(time(0));
    t1 = (double)(rand()%56+180)/10;
    t2 = (double)(rand()%56+180)/10;
    t3 = (double)(rand()%56+180)/10;
    t4 = (double)(rand()%56+180)/10;
    t5 = (double)(rand()%56+180)/10;
    cout << "The temperatures are: " <<endl<<
          t1<<endl<<t2<<endl<<
          t3<<endl<<t4<<endl<<t5<<endl;
}

```

10.2 Selections and Loops**Exc. 1**

See the outline of the program in the introductory section about if statements.

Exc. 2

Declare an integer variable to be used for storage of the user entered number. The if statement should then check if the number is less than 15. If so, one of the texts should be printed, otherwise the other text.

Exc. 3

//Complete with the followin code

```
if (iNo<15)
    cout << "You'll got to stick to the bike some more time ";
else if (tal<18)
    cout << "You are allowed to drive moped";
else
    cout << "You may drive the car";
```

Exc. 4

```
if (iNo1>iNo2 && iNo1>iNo3)
    cout << "The greatest is " << iNo1;
else if (iNo2>iNo1 && iNo2>iNo3)
    cout << "The greatest is " << iNo2;
else
    cout << "The greatest is " << iNo3;
```

Exc. 5

```
if (dGross > 500)
    dDisc = 10;
else if (dGross > 250)
    dDisc = 5;
else
    dDisc = 0;
```

Exc. 6

```
cout << "Enter product type (1=food, 2=misc): ";
cin >> iProdType;
if (iProdType == 1)
    dTaxAmount = dGross * 0.12;
else if (iProdType == 2)
    dTaxAmount = dGross * 0.25;
else
    cout << "Wrong product type";
```

Exc. 7

Use else if to locate different intervals. For 0-10000 the tax is 0. For 10000-50000 the tax is $0.5 \cdot \text{income} - 5000$. For 50000-100000 the tax is $0.5 \cdot \text{income}$. For >100000 the tax is $\text{income} \cdot 0.5 + (\text{income} - 100000) \cdot 0.2$.

Exc. 8

See the code proposal in the 'Even or Odd' section.

Exc. 9

Repeat the code so that you divide by 3 instead of 2 and print a suitable text.

Exc. 10

Declare a variable for each type of value and read the quantity of each. The sum of the crown types is:

```
iNoOf1kr + iNoOf5kr * 5 + iNoOf10kr * 10
```

For the 50-ore coins the number of whole crowns will be:

```
iNoOf50ore / 2
```

provided that `iNoOf50ore` is declared as integer. If `iNoOf50ore` is odd, there will be an extra 50-ore coin:

```
if (iNoOf50ore%2 == 1)
    cout << " and 50 ore";
```

Exc. 11

Use else if **repeatedly** to locate the various intervals and print corresponding discount.

Exc. 12

```
if (iNo>20 && iTot>1000)
    dDisc = 0.2;
else if (iNo>20 || iTot>1000)
    dDisc = 0.1;
else
    dDisc = 0;
```

Exc. 13

```
case 9:
    cout << "You selected to exit";
    break;
```

Exc. 14

```
case 4:
    cout << "The product is " << iNo1*iNo2;
    break;
```

Exc. 15

Combine the method for the previous menu program and the method to compare three numbers in a previous exercise.

Exc. 16

See the first program in the section about loops.

Exc. 17

Also print `iNo*iNo*iNo` inside the loop.

Exc. 18

```
do
{
    cout << "Enter a number: ";
    cin >> iNo;
}while (iNo!=0);
```

Exc. 19

Initiate a variable to 0 to keep track of the sum. Inside the loop you increase the sum variable by the entered value. After the loop you print the sum variable.

Exc. 20

Use the program structure from the previous program. Inside the loop you write an if statement which checks if `iNo` is less than 0 and print a suitable text.

Exc. 21

```
do
{
    cout << "Enter a number: ";
    cin >> iNo;
}while (iNo%3 != 0);
```


Exc. 22

Use input of the score in the while condition:

```
while (cin>>iScore)
```

Use a sum variable to store the accumulated sum of all scores entered so far.

The accumulation is made inside the loop.

Also declare two variables, `iGreatest` and `iLeast`, which store the greatest and the least score respectively. Inside the loop you will have to check if the recently entered score is greater than `iGreatest`. If so, assign this new value to `iGreatest`. Do the same with `iLeast`.

After the loop you subtract `iGreatest` and `iLeast` from the sum before printing the sum.

Exc. 23

Insert a statement which reads the requested product from the keyboard.

Exc. 24

Start from the program in the previous exercise. Let the loops go to 100 instead. Inside the first loop you check if the division numerator/denominator is 5 and if

`numerator%denominator` is 0. If so, you print the numerator and the denominator.

Exc. 25

Print `iRoll` inside the loop.

Exc. 26

```
while (iRoll!=5 && iRoll!=6)
```

Exc. 27

Print `iRoll1` and `iRoll2` from inside of the loop.

Exc. 28

```
while ((iRoll1 + iRoll2) != 12)
```

Exc. 29

Write an outer loop which goes from 1-13 and an inner which goes from 1-5. In the inner loop you create the random scores for the first match in the 5 different pools. You will have to accommodate the printout by means of the proper number of blanks to get the 5 pools separated from each other in 5 nice columns.

Exc. 30

`rand()%2` gives a random number between 0-1.

Inside the loop you check if the number is 0. If so, you print "heads", otherwise "tails".

Exc. 31

You can solve this in different ways. One way is to first create a random number in the interval 0-3, where the 4 different numbers correspond to colour (hearts, spades etc.). Then you can create a new random number between 1-13, where 2-10 is the corresponding value, 11 is jack, 12 is queen, 13 is king and 1 is ace.

Exc. 32

Change the calculation of LP to:

```
LP = iRoot * iRoot - 8 * iRoot + 15;
```

Exc. 33

Change the calculation of LP to:

```
LP = iRoot * iRoot * iRoot - 9 * iRoot * iRoot + 23 * iRoot - 15;
```

The while condition should check that `iNo < 3`.

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10.3 Arrays

Exc. 1

```
int iNos[10];
for (int i=0; i<10; i++)
{
    cout << "Enter integer: ";
    cin >> iNos[i];
}
```

a)

```
cout << iNos[0] << " " << iNos[4] << " " << iNos[9];
```

b)

In the for-loop you increase a sum variable by the recently entered number:

```
iSum += iNos[i];
```

After the for-loop you print iSum.

c)

```
for (i=9; i>=0; i--)
{
    cout << iNos[i] << " ";
}
```

d)

Create a loop which checks:

```
if (iNos[i] < 0)
    iNos[i] = -iNos[i];
```

e)

Read a number from the user to a variable iUserNo. In a loop you check:

```
if (iNos[i] < iUserNo)
    cout << iNos[i] << " ";
```

f)

Read a number from the user between 0-9 to the variable k. Then print iNos[k].

g)

Read a number from the user. Then write a loop which checks:

```
if (iNos[i] == iUserNo)
    cout << i;
```

h)

Copy `iNos[0]` to a variable `temp`. Then write a loop which goes from 0-8 and shifts location to the left:

```
iNos[i] = iNos[i+1];
```

Then you copy:

```
iNos[9] = temp;
```

Exc. 2

Complete the declaration of `iDaysInM`. Then let the user enter a month number to be used as index in the array (decreased by 1).

Exc. 3

Create a loop from 0-30 which creates random temperatures for the array:

```
dblTempJuly[i] = rand()%11 + 15;
```

Copy item by item to the array `dblTempAug` in a loop.

Then print `dblTempAug` in a loop.

Exc. 4

Code example is given in the "Comparing Arrays" section.

Exc. 5

Assign another value to one of the items of `dblTempAug`, e.g.:

```
dblTempAug[12] += 1;
```

Exc. 6

See code example in the "Average" section.

Exc. 7

Initiate the array `dDens` with the densities. Read one density from the user. Then write a loop which goes through all densities and checks if `dDens[i]` is greater than the entered value. If so, print `dDens[i-1]` and break the loop, so that only one value is printed.

Exc. 8

Create a loop from 0-24 which assigns values to the items:

```
iNos[i] = rand()%10;
```

Read a value from the user and create a loop which increments a variable each time an item equals the entered value:

```
int iNo = 0;
for (i=0; i<25; i++)
    if (iEntryValue == iNos[i])
        iNo++;
Then print iNo.
```

Exc. 9

```
if (sales[i] <= dLimit5)
    dFee = perc1 * sales[i];
else if (sales[i] <= dLimit10)
    dFee = perc1*dLimit5 + perc2*(sales[i]-dLimit5);
else
    dFee = perc1*dLimit5 + perc2*(dLimit10-dLimit5) +
        perc3*(sales[i]-dLimit10);
```

Exc. 10

Declare a new array `iNoOfSales[100]` which should hold the number of sales per salesman. Initiate the array to 0 values. When a salesman enters a value, you increase:

```
iNoOfSales[nr-1]++;
```

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The printout should contain an additional column where you print `iNoOfSales[i]`.

Exc. 11

Add one more column to the output where you print `sales[i]/iNoOfSales[i]`.

Exc. 12

See code example in the "Product File, Search" section.

Exc. 13

Read a quantity from the user and multiply it by the achieved price.

Exc. 14

Declare and initiate a two-dimensional array according to the code example in the "Two-Dimensional Array" section. Let the user enter product group and customer group and use these values as indices in the discount matrix to get a discount percent. Calculate the discount amount by multiplying the discount percent by the total price, and subtract the discount amount from the total price.

Exc. 15

Code example for random dice rolls is given in the chapter about Selections and Loops. Code example for sorting is given in the "Sorting" section.

Exc. 16

Code example is given in the "Searching a Sorted Array" section.

Exc. 17

```
if (iSrch == iProdid[iMid])
{
    iFound = 1;
    iPos = iMid;
    cout << iMid;
}
```

Exc. 18

```
if (r == l+1 && iFound == 0)
    cout << "The product id was not found";
```

In this situation you have enclosed an interval with the distance 1 between `l` and `r`. If then not found, the product id is not stored in the array.

Exc. 19

Declare and initiate a price array with prices for the products. Use the value of the variable `iMid` to get the corresponding price of the price array.
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10.4 Strings

Exc. 1

Add the following statements:

```
cout << "E. Statistics" << endl;
and:
case 'E':
    cout << "You selected Statistics";
    break;
```

Exc. 2

Start from the program 'Menu Program with Loop'.

Exc. 3

Read a character from the keyboard to a char variable. Then create a loop which goes from 1 to 10 and prints:

```
cout << cChar;
```

Exc. 4

Create an outer loop which goes from 1 to 10 with the loop variable *i*. Then create an inner loop which goes from 1 to *i*. Print the character *i* in the inner loop. After the inner loop, but inside the outer you print endl for line feed.

Exc. 5

Read the character to a char variable for instance named *cChar*. Read the number to an integer variable for instance named *i*. Then create a loop which goes from 1 to *i*. Inside the loop you print *cChar*.

Exc. 6

The first outer loop goes from 14 to 0. The second inner loop goes from 0 to 14-*i*. The last inner loop goes from 0 to 13.

Exc. 7

Read the character to a char variable. Then assign this value to an integer variable and print it.

Exc. 8

Read the character code to an integer variable. Assign this value to a char variable and print it.

Exc. 9

Use the character codes in the section about å, ä and ö in this chapter.

Exc. 10

Read the text to a string array with `cin.getline()`. Then use the functions `strlen()` and `sizeof`.

Exc. 11

Increase by 32 instead of decrease.

If you enter other characters, an increase by 32 gives a character that does not correspond to the relation between upper and lower case.

Exc. 12

Read the word to a char array. Then create a loop which goes from 0 to the length of the string minus 1. In each turn of the loop you print a character twice:

```
cout << cWord[i] << cWord[i];
```

Exc. 13

Read the word to a char array. Then create a loop which goes from 0 to the length of the string minus 1. In each turn of the loop you print a character:

```
cout << cWord[i];
```

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The other alternative is solved with:

```
cout << strrev(cWord);
```

Exc. 14

Change to the following code:

```
index = 1;
for (i=1; i<iLen; i++)
    if (cName[i] == ' ')
    {
        cInit[index] = cName[i+1];
        index = 2;
    }
cInit[3] = '\\0';
```

Also adjust the declarations of the variables.

Exc. 15

Write a new if statement where you check whether a character is greater than 90. If so, decrease the character code by 32 before inserting the character into the initials string.

Exc. 16

Create a loop which goes from character1 to character2 and prints the character corresponding to each character code.

Exc. 17

Use the strcmp() function which compares strings.

Exc. 18

Create a loop which goes from 0 to number of characters minus 1. Inside the loop you check whether cWord[i] equals a, o, u, e, i or y. If so, increase a counter (integer variable) by 1.

Exc. 19

Do like in the previous exercise when checking if the character is a consonant. If it is, you print:

```
cout << cWord[i] << "o" << cWord[i];
```

Exc. 20

See the code example in the 'Sorting Strings' section.

Exc. 21

Declare a new array with prices:

```
double dPrices[5];
```

and read values to it.

Use the formatting functions `setiosflags()`, `setprecision()` and `setw()` for the printout.

Exc. 22

See the example code in the "Interchanging First Name and Surname" section.

Exc. 23

Create a loop which goes through all characters of the entered string and checks if `cEmailadr[i] == '@'`. Print a suitable text in both cases.

Exc. 24

Use the `strcat()` function to concatenate two strings.

Exc. 25

Create a loop which searches for the period in the email address and a loop which searches for `@`. Save the positions of these characters. Then use the functions `strcpy()` and `strncpy()` to extract first name and surname. Then decrease the character codes of the first characters by 32 in the first and surnames.

Exc. 26

Change to:

```
cEncrypt[i] = cName[i] - 1;
```

Exc. 27

Change to:

```
cEncrypt[i] = cName[i] - 3;
```

Exc. 28

Increase by 3 instead of decrease.

Exc. 29

Find out the code of a character and decrease by 65, so that A corresponds to 0, B corresponds to 1 etc. (the variable `iCode`). The encrypted character should then have the code `90-iCode`, i.e. the code for 'Z' decreased by the value of `iCode`.

Exc. 30

Insert all characters into one bit string array:

```
char cKey[63] = "ABCD...Zabcd...z0123...9";
```

Then create a random position in this array:

```
iPos = rand() % 63;
```

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The character `cKey[iPos]` is then used for the password:

```
cPw[i] = cKey[iPos];
```

Exc. 31

Change to:

```
iLen = rand() % 5 + 6;
```

Exc. 32

Insert also lower cases in the string `cKey`. Change the limit of the first for-loop to 52. Let `j` get the value:

```
j = rand() % 52;
```

In the last for-loop you will have to check whether to subtract 65 or 71 from the character code, since there is a gap of 6 characters in the interval between upper case Z and lower case a.

```
if(cText[i]<97)
    cEncrypt[i] = cKey[cText[i] - 65];
else
    cEncrypt[i] = cKey[cText[i] - 71];
```



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10.5 Functions

Exc. 1

```
double dAvg(double x1, double x2, double x3)
{
    double mv;
    mv = (x1 + x2 + x3)/3;
    return mv;
}
```

Exc. 2

Start from the `min()` function at the beginning of this chapter and modify the `if` condition.

Exc. 3

See the code proposal in the "Least of Three Numbers" section.

Exc. 4

Add this statement:

```
n=max(iNos[i],n);
and
cout << n << " is the greatest number" << endl;
```

Exc. 5

```
double dCirc(double dLen, double dWid)
{
    return 2 * (dLen + dWid);
}
double dArea(double dLen, double dWid)
{
    return dLen * dWid;
}
double dPrice(double l, double b)
{
    return dCirc(l, b) * 145 + 650;
}
```

Exc. 6

Write a `for`-loop in the function which goes from 1 to `n` and prints `i`, `i*i` and `i*i*i`.

Exc. 7

Write a for-loop in the function which goes from 1 to n and prints c.

Exc. 8

Write a for-loop in the function which goes from 0 to `strlen(cWord)-1` and prints:
`cout << cWord[i] << " ";`

Exc. 9

In the chapter about Strings you will find code that solves these tasks.

Exc. 10

The new function header without parameters will be:

```
double dCustDisc()
```

Inside the function you read a character from the user. A switch statement can then return the correct factor (0.05, 0.07 or 0.09). Also use a default section providing an error message about "wrong customer category" and returns 0.

In the `dPrice()` function you change to:

```
return dLinePr * (1-dDiscPerc)*(1-dCustPerc)*(1+dTax);
```

Exc. 11

In `main()` you read the number of days, which is sent to the function `dayCost()`. That function calls `kmInput()` which reads start and end value. The difference between these values is returned to `dayCost()`. The function `litrePrice()` is called, which reads the fuel consumption in litres and returns that value * 9.27. The function `dayCost()` then returns the number of days * 500 plus number of km * 1.4 plus the fuel cost.

Exc. 12

Create a for-loop in the function which goes from 0 to `strlen(cWord)-1` and checks if `strcat(cWord[i], cWord[i+1])` equals "aa". If so, the character 'å' is printed, otherwise `cWord[i]` is printed. In the same way you check the characters "ae" and "oe". The character codes for å, ä and ö are given in the "Strings" chapter.

Try to solve this problem without looking at the code proposal below:

```
void check (char s[])
{
    int len=strlen(s);
    char p[3];
    for (int i=0; i<len; i++)
    {
        p[0]=s[i];
```

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```

        p[1]=s[i+1];
        p[2]='\0';
        if (strcmp(p, "aa") == 0)
        {
            i++;
            cout << "\x86";
        }
        else if (strcmp(p, "ae") == 0)
        {
            i++;
            cout << "\x84";
        }
        else if (strcmp(p, "oe") == 0)
        {
            i++;
            cout << "\x94";
        }
        else
            cout << s[i];
    }
}

```



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Exc. 13

Change to:

```
if ((c>='0' && c<='9') || (c=='.'))
```

Exc. 14

```
if ((val>=2) && (val<=10))
    cout << val;
else
    switch val
    {
        case 1:
            cout << "Ace";
            break;
        case 11:
            cout << "Jack";
            break;
        etc.
```

Exc. 15

Create another switch statement which tests the other parameter and prints the correct colour of the card.

Exc. 16

In the functions `odd()` and `divable()` you use the modulus operator `%`. In the other functions you check if the character code of `c[0]` is in the correct interval.

Exc. 17

In `main()` you read values to three different variables, which means that the user has to enter a blank between each character. The three variables must be of type `int`, `char` and `int`. In a switch statement you then check if the `char` variable is `+`, `-`, `*` or `/` and send the two integer variables to the respective function. The functions return `int` (`+` `-` `*`) or `double` (`/`). The returned values are `a+b`, `a-b`, `a*b` and `(double)a/b`.

Exc. 18

The function takes a `char[]` parameter and returns 0, 10, 15 or 20. Use a switch statement that compares the first character of the parameter against the first character of "G", "VG", "MVG" and "IG". In `main()` you use a loop for entry of score and number of hours. In the loop you accumulate the score * number of hours for each course. Also accumulate the total number of hours. After the loop you divide the total score by the total number of hours.

Exc. 19

```
double dDiscount(int iNo, double dTotPrice)
double dDiscount(char cCustGroup)
```

Exc. 20

See the section 'Declaration - Definition'.

Exc. 21

See the section 'Project'.

Exc. 22

Use & after the data type, for instance:

```
double dayCost(int& iNo)
```

Exc. 23

```
double fuelPrice(double dLitrePrice=9.32)
```

Exc. 24

```
double dRoll(int iNo=5)
```

In the function you write a loop which goes from 1 to iNo and create random dice scores with `rand()%6+1`. These are accumulated in the loop. After the loop you divide the sum by iNo.

Exc. 25

In `main()` you need one variable which stores the user score and one that stores the computer's score.

Exc. 26

The user and computer scores are sent as parameters to the function, where you compare them and print a suitable text.

Exc. 27

Use & for the parameters.

Exc. 28

See the section 'Recursive Functions'.

Exc. 29

```
int nsum(int n)
{
    if (n<=1)
        return 1;
```



```
    else
        return n + nsum(n-1);
}
```

Exc. 30

```
int nsum(int n)
{
    if (n<=1)
        return -1;
    else
    {
        int k;
        if ((n%2)==0) //If the number is even, k is set =1
            k=1;
        else
            k=-1;
        k *= n; //Here odd numbers will be negative
        return (k + nsum(n-1));
    }
}
```

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10.6 Files

Exc. 1

Add the statement:

```
cin.getline(cWhloc,8);
```

at two different locations in the program

Also change the file output statement:

```
outfile << cProd << endl << cWhloc << endl;
```

Exc. 2

Change to:

```
while(infile.getline(cProd,29) &&
```

```
    infile.getline(cWhloc,8))
```

```
    cout << cProd << " " << cWhloc << endl;
```

Exc. 3

Read the warehouse location from the user in the same way as the product name. Also write the warehouse location to the file with endl in between.

Exc. 4

Add:

```
cout << " ...and stock quantity: ";
```

```
cin >> iQty;
```

Change to:

```
outfile << iProdId << endl << dPrice << endl << iQty << endl;
```

Exc. 5

Change to:

```
while(infile >> iProdId >> dPrice >> iQty)
```

Add:

```
cout << "Stock quantity is " << iQty;
```

Exc. 6

You will need another two-dimensional array, where you store the warehouse locations. The sort function must have an additional parameter for the warehouse location array. When interchanging position of two product names, you must also interchange corresponding warehouse location items.

Exc. 7

You will need additional statements to read the new stock quantity value. In the file output statement you must also print the stock quantity to the file.

Exc. 8

Start from the program where you print product name and warehouse location. You should modify it to print first name, surname and city. Use `ios::app` to prevent cancellation of previous information in the file.

Exc. 9

Start from the program reading products and warehouse locations from a previous exercise, and modify it to conform to the file created in the previous exercise.

Exc. 10

Compare to the program where you were able to change price and stock quantity (exc. 7). Remember to read with `getline` since it is strings and not numeric values in this program.

Exc. 11

The program has a similar structure as the previous program. The only difference is that, when the name from the file equals the one entered by the user, you don't print that name to the file.

Exc. 12

Start from the program in Exc. 6 which sorted products and warehouse locations. You will however need an additional two-dimensional array, so that you have one for first names, one for surnames and one for cities. When interchanging positions of two surnames, you must also interchange corresponding positions in the two other arrays.

Exc. 13

You can use the code example in the 'Copying Files' section.

Exc. 14

You need one additional while loop where the menu is printed and where the user can enter a menu choice. By means of a switch statement you can perform the requested task. Utilize the code already created in the previous exercises.

10.7 Pointers

Exc. 1

See the code example in the "Assigning Values to Pointers" section.

Exc. 2

See the code example in the sections "Addresses and char Pointers" and "cout and char Pointers".

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Exc. 3

Add this code:

```
double dDisc;
double* pDisc = &dDisc;
```

and

```
cout << "Enter discount in percent: ";
cin >> *pDisc;
```

Change the calculation statement to:

```
*pTotal = *pNo * *pPrice * (1 - *pDisc/100);
```

Exc. 4

It should be possible to use the program in the section "Price Program with Pointers" as the starting point. The number of litres should be divided by the number of km to get the fuel consumption.

Exc. 5

See the code example in the section "Price Program with Pointers".

Exc. 6

Declare the array as shown in the section "Pointer Arithmetics". Then write a for-loop which reads the values from the user. Increment the pointer variable



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with the ++ operator. Write another for-loop which prints the values. Don't forget to reset the pointer to the first item of the array before the last for-loop.

Exc. 7

Declare a sum variable and initiate it to 0. Declare a pointer (pSum) which points to the sum variable. In the first for-loop you accumulate the read values with a statement like this:

```
*pSum += *pNumber;
```

Exc. 8

Delete the initiation lists for iSal and dTax. Write a for loop which reads one salary and one tax percent at a time by means of the pointers. Don't forget to increment the pointers with the ++ operator inside the loop. Before printing the table you must reset both pointers to point to the first item of each array by decreasing them by 6:

```
pSal = pSal - 6;  
pTax = pTax - 6;
```

Exc. 9

First, prepare the file by writing in Notepad each second salary and each second tax percent. Press Enter after each item. You might also need to take a look in the Files chapter to be able to declare an instream correctly.

Exc. 10

First prepare the file like in the previous exercise. Then it should be possible to accommodate the code from the previous exercise.

Exc. 11

Delete the printout code of the table. First read the product id from the user. Then write a loop which goes through the items of the product array and checks if the entered id equals the one in the array. If so, the corresponding price is printed:

```
for (int i=0; i<iNoOfProducts; i++)  
{  
    if (*pEnteredProdId == *pProdId)  
        cout << "The price is: " << *pPrice;  
    pProdId++;  
    pPrice++;  
}
```

Exc. 12

First reset the pointer to the beginning of the string and then print it in the cout statement.

Exc. 13

Before sending the pointer to the function you can create a copy of the string, so that the copy is not modified by the function. The copy can be printed, which gives the original email address.

Exc. 14

The function should go from character to character in the string by means of pointer arithmetics and check if the character code exceeds 96. If so, decrease it by 32. The new character should replace the original in the string.

Exc. 15

The function should use pointer arithmetics when stepping through the items of the array. Create a local variable, `iMax`, in the function to which you assign the value of the first item. Then a loop will step through the remaining items and compare them to `iMax`. If any item exceeds `iMax`, you set `iMax` equal to that item. Return `iMax`.

In the `main()` program you declare an array of 8 items and a pointer which points to the first item of the array. In a for-loop you let the user enter values to be stored in the location pointed at by the pointer. Don't forget to increment the pointer for each turn of the loop. Before calling the function you must decrease the pointer by 8 to make it point to the beginning of the array. Send the pointer and the number 8. Print the returned value.

Exc. 16

In the `main()` program you first let the user enter the number quantity. Then declare the array dynamicly. Also check that the requested memory space could be allocated as described in the section "Dynamic Memory". Don't forget to release the dynamic memory with `delete` at the end of the program.

Exc. 17

You should in principle be able to copy some of the lines in the program and accommodate them to the telephone numbers:

```
char cTeltemp[15]; //Temporary storage of entered tel no
char *cTel[iNo]; // Pointer array with telno:s

cout << "Telephone number " << i + 1 << " ";
```

```
cin.getline(cTeltemp, 15); // Temporary storage

cTel[i] = new char[strlen(cTeltemp) + 1];
// Copy the telno to the pointer array:
strcpy(cTel[i], cTeltemp);

cout << cNames[j] << " " << cTel[j] << endl;

delete [] cTel[k];
```

Exc. 18

A checking example is given in the first program of the section "Dynamic Memory". A similar check is inserted at each usage of the new keyword.

10.8 Structures

Exc. 1

Start from the Prod structure given in the chapter text and modify data types and names of the members.

Exc. 2

See the code example of the section "A Structure Program", where entry to a structure variable is given.



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Exc. 3

See the section "Array with Structure Variables" where code examples are given.

Exc. 4

Create a loop which goes through each customer and prompts the user for the invoice total. It is added to the structure member which contains invoice total year-to-date.

Exc. 5

See the section "Array with Structure Variables" where code examples are given.

Exc. 6

See the section "Pointer to Structure" where code examples are given.

Exc. 7

See the section "Pointer to Structure" where code examples are given.

Exc. 8

Use the code example in the section "Structures in the Dynamic Memory".

Exc. 9

See the section "Structure as Function Parameter - Reference Parameter". Declare an ostream with `ios::app`. You might need to take a look in the Files chapter.

Exc. 10

See the section "Structure as Function Parameter - Array Parameter".

Exc. 11

See the section "Structure as Function Parameter - Pointer Parameter".

Exc. 12

Declare an instream from which you read. The input goes to a structure which is printed on the screen. The function is of void type and takes no parameters.