C++ 第二次实验参考答案

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注：练习时，代码一定要对得很整齐。这个习惯一定要养成。

人民币那题很不用数组的话只能分前四位后四位穷举，比较繁琐；此参考答案中使用了二维数组。

1、输入一个数，判断它的奇偶性后输出结果。

```
//if else
#include <iostream>
#include <cmath>
using namespace std;

int main(){
    int n;
    cout << "Pleased input a integer: ";
    cin >> n;
    if( 0 == n % 2 ){
        cout << "Even number." << endl;
    }
    else{
        cout << "Odd number." << endl;
    }

    return 0;
}

// ? :
#include <iostream>
#include <cmath>
using namespace std;

int main(){
    int n;
    cout << "Pleased input a integer: ";
    cin >> n;
    n % 2 == 0 ? cout << "Even number." : cout << "Odd number.";
    cout << endl;

    return 0;
}
```

2、编程求一元二次方程 $ax^2+bx+c=0$ 的根。包括以下判断和结果，若输入 $a=0$, 给出提示；$\Delta=b^2-4ac$, 若 $\Delta>0$, 输出两个不等的实根；

```
#include <iostream>
#include <cmath>
using namespace std;

int main(){
    int a, b, c;
    cout << "Please input three integer parameters for the equation(a, b, c): ";
    cin >> a >> b >> c;
    int delta = b*b - 4*a*c;
    double x1, x2;

    if( 0 == a ){
        cout << "Illegal input, a can't be zero." << endl;
        return -1;
    }
    else{
        if( 0 == delta ){
            x1 = x2 = -0.5*b/a;
            cout << " Equation has the same 2 roots: " << endl;
            cout << '\t' << x1 << '\t' << x2 << endl;
        }
        else if( delta > 0 ){
            x1 = 0.25/a * ( -b + sqrt( (double)delta ) );
            x2 = 0.25/a * ( -b - sqrt( (double)delta ) );
            cout << " Equation has 2 different roots: " << endl;
            cout << '\t' << x1 << '\t' << x2 << endl;
        }
        else{
            double real, imag;
            real = 0.25/a * ( -b );
            imag = 0.25/a * sqrt( -(double)delta );
            cout << " Equation has 2 imaginary roots: " << endl;
            cout << '\t' << real << '+' << imag << 'i';
            cout << '\t' << real << '-' << imag << 'i' << endl;
        }
    }

    return 0;

output:
```

```
Please input three integer parameters for the equation(a, b, c): 1 2 1
 Equation has the same 2 roots:
        -1      -1
Please input three integer parameters for the equation(a, b, c): 1 2 3
 Equation has 2 imaginary roots:
        -0.5+0.707107i  -0.5-0.707107i
}
```

3、编写程序：输入一门课程的成绩，若高于 90 分，输出“A grade ”；若高于 80 分而低于 90 分，输出“B grade ”；若高于 70 分而低于 80 分，输出“C grade ”；若高于 60 分而低于 70 分，输出“D grade ”；否则输出“Not passed ”。

```cpp
//if else
#include <iostream>
#include <cmath>
using namespace std;

int main(){
    int mark;
    cout << "Please input the mark (integer, 0~100): ";
    cin >> mark;

    if( mark >= 90 ){
        cout << "A grade" << endl;
    }
    else if( mark >= 80 ){
        cout << "B grade" << endl;
    }
    else if( mark >=70 ){
        cout << "C grade" << endl;
    }
    else if( mark >= 60 ){
        cout << "D grade" << endl;
    }
    else{
        cout << "Not passed" << endl;
    }

    return 0;
}

//switch case
#include <iostream>
```

```cpp
#include <cmath>
using namespace std;

int main(){
    int mark;
    cout << "Please input the mark (integer, 0~100): ";
    cin >> mark;

    mark /= 10;

    switch( mark ){
    case 9:
        cout << "A grade" << endl;
        break;
    case 8:
        cout << "B grade" << endl;
        break;
    case 7:
        cout << "C grade" << endl;
        break;
    case 6:
        cout << "D grade" << endl;
        break;
    default:
        cout << "Not passed" << endl;
    }

    return 0;
}

// array
#include <iostream>
#include <cmath>
using namespace std;

int main(){
    int mark;
    cout << "Please input the mark (integer, 0~100): ";
    cin >> mark;

    mark /= 10;
```

```
    char grade[4] = { 'A', 'B', 'C', 'D' };
    if( mark > 5 )
        cout << grade[9-mark] << " grade" << endl;
    else
        cout << "Not passed" << endl;

    return 0;
}
```

4、编写程序：输入一个数，判断其是否是 3 或 7 的倍数，可分为 4 种情况输出。（1）是 3 的倍数，但不是 7 的倍数。（2）不是 3 的倍数，是 7 的倍数。（3）是 3 的倍数，也是 7 的倍数。（4）既不是 3 的被数，也不是 7 的倍数。

```
// if else
#include <iostream>
#include <cmath>
using namespace std;

int main(){
    int num;
    cout << "Please input a number (integer): ";
    cin >> num;

    if( 0 == num%3 && 0 != num%7 ){
        cout << "是的倍数，但不是的倍数37" << endl;
    }
    else if( 0 != num%3 && 0 == num%7 ){
        cout << "不是的倍数，是的倍数37" << endl;
    }
    else if( 0 == num%3 && 0 == num%7 ){
        cout << "是的倍数，也是的倍数37" << endl;
    }
    else if( 0 != num%3 && 0 != num%7 ){
        cout << "既不是的被数，也不是的倍数37" << endl;
    }
    return 0;
}

//
#include <iostream>
#include <cmath>
using namespace std;
```

```
int main(){
    int num;
    cout << "Please input a number (integer): ";
    cin >> num;

    if( 0 == num%3 ){
        if(  0 == num%7 )
            cout << "是的倍数，是的倍数37" << endl;
        else
            cout << "是的倍数，但不是的倍数37" << endl;
    }
    else{
        if(  0 == num%7 )
            cout << "不是的倍数，是的倍数37" << endl;
        else
            cout << "既不是的倍数，也不是的倍数37" << endl;
    }
    return 0;
}
```

1、输入三个数字 a,b,c，运用 if-else 语句分别判断 a，b，c 的大小。

```
// if else
#include <iostream>
#include <cmath>
using namespace std;

int main(){
    int a, b, c;
    cout << "Please input three integer numbers (a, b, c): ";
    cin >> a >> b >> c;

    int max;
    int middle;
    int min;

    if( a > b && a > c ){
        max = a;
    }
    else if ( b > c ){
        max = b;
    }
    else{
        max = c;
```

```
    }

    if( a < b && a < c ){
        min = a;
    }
    else if ( b < c ){
        min = b;
    }
    else{
        min = c;
    }

    if( a < max && a > min ){
        middle = a;
    }
    else if( b < max && b > min ){
        middle = b;
    }
    else{
        middle = c;
    }
    cout << '\t' << max << " > " << middle << " > " << min << endl;
}

output:
Please input three integer numbers (a, b, c): 1 3 2
        3 > 2 > 1
```

2、运用 switch 语句分三种情况，运用 while 语句输入 60 次选择，最后加和，输出结果票数。

```
// switch case
#include <iostream>
#include <cstdlib>
using namespace std;

int main(){
    int a, b, c;
    a = b = c = 0;

    cout << "Polling..." << endl;
    for( int i = 0; i < 30; i ++ ){
        for( int j = 0; j < 2; j ++ ){
            int poll = rand()%3 + 1;
            switch( poll ){
```

```
            case 1:
                ++ a;
                break;
            case 2:
                ++ b;
                break;
            case 3:
                ++ c;
                break;
            default:
                cout << "Illegal input. Negnected." << endl;
            }
        }
    }
    cout << " The votes are: " << endl;
    cout << '\t' << a << '\t' << b << '\t' << c << endl;

    return 0;
}

output:
Polling...
 The votes are:
        20      18      22
```

3、输入一个正整数 n，运用 for 语句，输出阶乘结果。

```
//long long
#include <iostream>
using namespace std;

int main(){
    int n;
    cout << "Input n (integer, <= 20): ";
    cin >> n;

    long long fp = 1;
    int i = n;
    while( i > 0 ){
        fp *= i;
        -- i;
    }

    cout << n << "! = " << fp << endl;
```

```
    return 0;
}

output:
Input n (integer, <= 20): 20
20! = 2432902008176640000
```

4、输入年份，月份，日期，运用 if-else 语句判断是否为闰年，闰年二月份为 28 天，运用 for 语句算出天数是本年第几天，输出结果。

```
#include <iostream>
using namespace std;

int main(){
    int year, month, day;
    cout << "Input the date(year month day): ";
    cin >> year >> month >> day;

    int isLeap = 0;
    if( ( 0 == year % 4 && 0 != year %100 ) || 0 == year %400 ){
        isLeap = 1;
        cout << "Leap year." << endl;
    }

    int dayspermonth[12] = { 31, 0, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31 };
    isLeap ? dayspermonth[1]= 29 : dayspermonth[1]= 28;

    int thisday = 0;
    for( int i = 0; i < month - 1; i ++ ){
        thisday += dayspermonth[i];
    }
    thisday += day;

    cout << "This is Day " << thisday << '.' << endl;

    return 0;
}
```

5、输入一个整数（位数不超过 9 位）代表一个人民币值（单位为元），请转换成财务要求的大写格式。如 23108 元，转换后变成“贰万叁仟壹佰零捌元”。200101 元，转换后变成“贰拾万零壹佰零壹元”。

```
#include <iostream>
#include <cmath>
```

```
using namespace std;

int main()
{
        char *one2ten = "零壹贰叁肆伍陆柒捌玖";
    char *units = "萬仟佰拾元";

    char one2ten_index[10][3];    // 零壹贰叁肆伍陆柒捌玖
    for( int i = 0; i < 10; i ++ ){
        for( int j = 0; j < 2; j ++ ){
            one2ten_index[i][j] = one2ten[i*2+j];
        }
        one2ten_index[i][2] = '\0';
        //cout << one2ten_index[i] << endl;
    }

    char units_index_0[5][3];    // 萬仟佰拾
    for( int i = 0; i < 5; i ++ ){
        for( int j = 0; j < 2; j ++ ){
            units_index_0[i][j] = units[i*2+j];
        }
        units_index_0[i][2] = '\0';
        //cout << units_index_0[i] << endl;
    }

    int money;
    cout << "输入一个小于位的整数9: ";
    cin >> money;
    if( money <=0 || money >= 1e8 ){
        cout << "输入错误" << endl;
        return -1;
    }

    int N = 8;
    while( 0 == money / (int)pow( 10, N) ){
        -- N;
    }
    ///++ N; // 获得输入数的位数

    int tail = money;
    int inc = N;
    int head;
```

```
    if( N > 3 ){
        while( inc > 4 ){
            head = tail / (int)pow( 10, inc );
            cout << one2ten_index[head];
            cout << units_index_0[8 - inc];
            tail %= (int)pow( 10, inc );
            -- inc;
        }
        head = tail / (int)pow( 10, inc );
        cout << one2ten_index[head];
        cout << units_index_0[0];
        tail %= (int)pow( 10, inc );
        -- inc;
    }
    while( inc >= 0 ){
        head = tail / (int)pow( 10, inc );
        cout << one2ten_index[head];
        cout << units_index_0[4-inc];
        tail %= (int)pow( 10, inc );
        -- inc;
    }

    cout << endl;

    return 0;
}
```

6、编写程序计算 y=1-1/2+1/3-1/4+...+1/n

```
#include <iostream>
using namespace std;

int main(){
    int n;
    cout << "Input n (integer, > 0): ";
    cin >> n;

    double sum = 1.0;
    int p = -1;
    for( int i = 1; i < n; i ++){
        sum += 1.0 * p / ( i + 1.0 );
        p = -p;
    }
    cout << "y = " << sum << endl;
```

```
    return 0;
}
```