

CMSC 256 Midterm exam

Spring 2007

For problem 1 - 2, assume that the following declaration have been made

```
vector<int> number,  
           v(10,10),  
           w(10);
```

```
int num;
```

and that for problems that involve input, the following values are entered:

11 99 33 44 88 22 11 35 55 66 77 -1

Describe the content of the given vector after the statements are executed.

1.

```
for (;;)
```

```
{
```

```
    cin >> num;
```

```
    if (num < 0 ) break;
```

```
    number.push-back(num);
```

```
}
```

2.

```
for (int i = 0; i < number.size() -1; i += 2)
```

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

For problems 3 - 4 deals with operations on n-dimensional vectors, which are sequences of n real numbers and which are studied and used in many areas of mathematics and science. They can obviously be modeled in C++ by vector<double>s of capacity n. In the description of each operation, A and B are assumed to be n-dimensional vectors:

$$A = (a_1, a_2, \dots, a_n)$$

$$B = (b_1, b_2, \dots, b_n)$$

3. compute and return the magnitude of an n dimensional vector:

$$|A| = \sqrt{a_1^2 + a_2^2 + \dots + a_n^2}$$

4. compute and return the inner product of two n-dimensional vectors

$$A \cdot B = a_1 \times b_1 + a_2 \times b_2 + \dots + a_n \times b_n = \sum_{i=1}^n (a_i \times b_i)$$

For problems 5-6, define the private portion of a class to model the given item.

5. A telephone number as area code, local exchange, and number.

6. Position of checker on a board.

For problems 7 and 8, assume the following classes temperature
//Temperature.h

```
const double MIN_FARENHEIT = -459.67;
const double MIN_CELSIUS   = -273.15;
const double MIN_KELVIN    = 0;

class Temperature
{
    public:
        temperature();
        temperature(double initialDegrees, char initialScale);

        double getDegree() const;
        char getScale();

        Temperature inFahrenheit() const;
        Temperature inCelcius() const;
        Temperature inKelvin() const;

        void print(ostream& out ) const;

        static bool isValid(double degrees, char scale);
    private:
        double myDegrees
        char myScale
}
}
```

7. Overload operator + for class Temperature.

8. Overload operator << for class Temperature to display temperature and Scale.

9. Add a constructor to the class Matrix that, upon receiving a vector of double values, builds a Matrix object containing one row containing the element of that vector.

10. write a template program that can add two values A and B. Note that A and B can be a double, integer or string

11 Design a class for doing simple arithmetic with names of numbers (given by enumeration); for example, zero, one, two, ... , nine , ten. Operation should at least includes input, output and some of the relation operators.