

Hint: We ask you to use vector to store the total number of rolls that gives the results of 3, 3, 4, ..., 18. Declaring 16 separate variables is a bad idea.

**Problem 3.** [35 points] *Pokemon Battle!* Write a function with the following signature to simulate one round of a Pokemon attack:

```
void attack(double &attackerHealth, double &defenderHealth, int move);
```

Here `attackerHealth` is the current health state for the attacker, and `defenderHealth` is the current health state for the defender. Both input variables have a possible value range from 0.0 to 100.0. The user and the computer will take turns to choose one of the following three moves based on the following value of `move`:

- 1: an attack with damage between 15.0 and 30.0 with equal probability to the defender
- 2: an attack with damage between 0.0 and 50.0 with equal probability to the defender.
- 3: Heal an amount between 5.0 and 20.0 with equal probability to the attacker.

Using this function, write a main program that simulates a Pokemon battle between the user and the computer (this function can be used for both user turn and the computer turn). Initially, both the user and the computer have a health point of 100. The user should take the first move, and the function should take the user's choice of move using `cin`. If the user entered an invalid option, please ask the user to enter a new choice again until a valid option is entered. The computer should choose the heal option when its health is below 25, otherwise the computer will choose one of the three options with equal probability. After each attack, a message should be printed out that tells the user what just happened, and how much health the user and computer have. If a heal leads to a health state over 100.0, the health state will be set to 100.0. If an attack leads to a health state below 0.0, the health state will be set to 0.0, and the battle ends.

There is no write-up for this problem.

Submit your .cpp file as "yourLastName\_hw7\_prob3.cpp".

**What to submit:**

There should be 3 files in your submission:

- 1. A write up (any type- .txt, .docx, .pdf are all fine) that contains your answers to all questions in problem 1 and 2.
- 2. The .cpp file for your problem 1. Please name this file as [YourLastName]\_prob1.cpp.
- 3. The .cpp file for your problem 2. Please name this file as [YourLastName]\_prob2.cpp.

4. The .cpp file for your problem 3. Please name this file as [YourLastName]\_prob3.cpp.

**Optional Short answers questions. The following questions will not be graded. You may use them for preparing your next week's quiz.**

- (1) What will the following code output?

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

void printNumber(int num) {
    cout << "Integer: " << num << endl;
}

void printNumber(double num) {
    cout << "Double: " << num << endl;
}

void printNumber(int num1, int num2) {
    cout << num1 << " and " << num2 << endl;
}

int main() {

    double a = 4.1;
    int b = 3;

    printNumber(a);
    printNumber(b);
    printNumber(a, b);

    return 0;

}
```

- (2) Please complete the following C++ function that computes the series  $(1) + (1+2) + (1+2+3) + (1+2+3+4) + \dots + (1+2+3+4+\dots+n)$  using **a nested for loops**.

```
int func(int n){

    // you may assume n > 0.
    // No error checking is needed
```

```
        return ret;
    }
```

(3) Please fix **FIVE** errors in the following code so the function computes `abs(a-b)`, where `a` and `b` are both double variables. When you run the program, the correct code should display **0.9** on the screen.

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

int main() {
    double a = 1.5;
    double b = 2.4;

    cout<< difference(double a, double b)<< endl;

    return 0;
}

int difference(int x, int y){
    double diff = abs(x-y);
}
```

(4) Please identify and correct the error in the following function.

```
bool isPositive(double num) {
    // the function returns true if num is positive
    // the function returns false otherwise

    if (num > 0){

        bool ret = true;
```

```
    }else{  
        bool ret = false;  
    }  
    return ret;  
}
```

(5) What is the output?

```
int i = 150;  
for(int i = 0; i < 2; i++) {  
    cout << i << endl;  
}  
cout << i << endl;
```

(6) What is the output?

```
int a = 5;  
int &b = a;  
int c = a;  
  
cout << a << ", " << b << ", " << c << endl;  
c = 3;  
cout << a << ", " << b << ", " << c << endl;  
b = 4;  
cout << a << ", " << b << ", " << c << endl;  
a = 7;  
cout << a << ", " << b << ", " << c << endl;
```

(7) What is the output of the following C++ code? Do you think it works in the correct way?

```
#include <iostream>  
using namespace std;  
  
void swap(int &a, int b) {  
    int t = a;  
    a = b;
```

```
        b = t;
    }

    int main() {
        int q = 3;
        int r = 5;
        swap(q, r);
        cout << "q " << q << endl;
        cout << "r " << r << endl;

        return 0;
    }
```

(8) What is the output of the following code?

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

void doubleNumber(int num){
    num = num*2;
}

int main(){
    int num = 35;
    doubleNumber(num);
    cout << num << endl;
    return 0;
}
```