# Group 3: Nguyễn Đức Duy Nguyễn Công Hoàng Trần Quốc Bảo

Project 5

## Check point

#### 1. Write a for loop that displays your name 10 times (5.9)

#include <iostream>

**using namespace** std;

**int** main() {

**for** (**int** i = 0; i < 10; i++) {

cout << "Duy Hoang Bao\n";

}

**return** 0;

}

#### 2. Write a for loop that displays all of the odd numbers, 1 through 49. (5.10)

#include <iostream>

#include <iomanip>

**using namespace** std;

**int** main() {

**const int** COLUMN = 10;

**for** (**int** i = 1, j = 0; i <= 49; i+=2) {

cout << setw(3) << i << ' ';

j++;

**if** (j == COLUMN) {

j = 0;

cout << '\n';

}

}

**return** 0;

}

## Programming Challenges

#### 1. Calories Burned (4) Running on a particular treadmill you burn 3.9 calories per minute. Write a program that uses a loop to display the number of calories burned after 10, 15, 20, 25, and 30 minutes.

#include <iostream>

#include <iomanip>

**using namespace** std;

**int** main() {

**const double** burnCalpm = 3.9;

cout << setw(10) << "Minutes" << setw(15) << "Burned Calories" << endl;

cout << fixed << setprecision(1);

**for** (**int** i = 5; i <= 30; i+= 5) {

cout << setw(10) << i << setw(15) << burnCalpm \* i << '\n';

}

**return** 0;

}

#### 2. Membership Fees Increase (5) A country club, which currently charges $2,500 per year for membership, has announced it will increase its membership fee by 4% each year for the next six years. Write a program that uses a loop to display the projected rates for the next six years.

#include <iostream>

#include <iomanip>

**using namespace** std;

**int** main() {

**const double** STD\_FEE = 2500.0;

**double** curFee = STD\_FEE;

cout << setw(5) << "Year" << setw(10) << "Fee" << endl;

cout << fixed << setprecision(1);

**for** (**int** i = 1; i <= 6; i++) {

cout << setw(5) << i << setw(10) << curFee << '\n';

curFee \*= 1.04;

}

**return** 0;

}

#### 3. Distance Traveled (6) The distance a vehicle travels can be calculated as follows:

#### distance = speed \* time

#### For example, if a train travels 40 miles per hour for 3 hours, the distance traveled is 120 miles. Write a program that asks the user for the speed of a vehicle (in miles per hour) and how many hours it has traveled. The program should then use a loop to display the distance the vehicle has traveled for each hour of that time period. Here is an example of the output:

#### 

#### Input Validation: Do not accept a negative number for speed and do not accept any value less than 1 for time traveled.

#include <iostream>

#include <iomanip>

**using namespace** std;

**int** main() {

**int** time;

**double** speed;

cout << "What is the speed of the vehicle in mph?\t";

**do** {

cin >> speed;

**if** (speed < 0)

cout << "Speed cannot be negative, enter again.\n";

} **while** (speed < 0);

cout << "How many hours has it traveled?\t";

**do** {

cin >> time;

**if** (time < 1)

cout << "Time traveled cannot be smaller than 1, enter again.\n";

} **while** (time < 1);

cout << setw(10) << left << "Hour" << setw(25) << "Distance Traveled" << endl;

cout << "--------------------------------\n";

**for** (**int** i = 1; i <= time; i++) {

cout << ' ' << setw(9) << left << i << setw(10) << right << speed \* i << '\n';

}

**return** 0;

}

#### 4. Pennies for Pay (7) Write a program that calculates how much a person would earn over a period of time if his or her salary is one penny the first day and two pennies the second day, and continues to double each day. The program should ask the user for the number of days. Display a table showing how much the salary was for each day, and then show the total pay at the end of the period. The output should be displayed in a dollar amount, not the number of pennies.

#### Input Validation: Do not accept a number less than 1 for the number of days worked.

#include <iostream>

#include <iomanip>

**using namespace** std;

**int** main() {

**int** days;

**double** total = 0.0;

cout << "Worked days:\t";

**do** {

cin >> days;

**if** (days < 1)

cout << "Worked days cannot be smaller than 0.\n";

} **while** (days < 1);

cout << setw(5) << "Day" << setw(12) << "Salary ($)" << endl;

cout << "--------------------\n";

cout << fixed << setprecision(2);

**double** temp = 0.01;

**for** (**int** i = 1; i <= days; i++) {

cout << setw(5) << i << setw(12) << temp << '\n';

temp \*= 2;

total += temp;

}

cout << "--------------------\n";

cout << "Total:\t$" << total;

**return** 0;

}

#### 5. Average Rainfall (10) Write a program that uses nested loops to collect data and calculate the average rainfall over a period of years. The program should first ask for the number of years. The outer loop will iterate once for each year. The inner loop will iterate twelve times, once for each month. Each iteration of the inner loop will ask the user for the inches of rainfall for that month.

#### After all iterations, the program should display the number of months, the total inches of rainfall, and the average rainfall per month for the entire period.

#### Input Validation: Do not accept a number less than 1 for the number of years. Do not accept negative numbers for the monthly rainfall.

#include <iostream>

#include <string>

**using namespace** std;

**int** main() {

**int** years;

**double** rain = 0.0;

cout << "Number of years:\t";

**do** {

cin >> years;

**if** (years < 1)

cout << "Period cannot smaller than 1, enter again.\n";

} **while** (years < 1);

**for** (**int** i = 1; i <= years; i++) {

string pt1 = (i == 1) ? "st" : (i == 2 ? "nd" : "th");

**for** (**int** j = 1; j <= 12; j++) {

string pt2 = (j == 1) ? "st" : (j == 2 ? "nd" : "th");

cout << "Inches of rain fall for the " << j

<< pt2 << " month of the " << i << pt1 << " year:\t";

**double** d;

**do** {

cin >> d;

**if** (d < 0)

cout << "Rainfall inches cannot be negative, enter again:\t";

} **while** (d < 0);

rain += d;

}

}

cout << "Number of months:\t" << years \* 12 << endl;

cout << "Total inches of rainfall:\t" << rain << endl;

cout << "Average rainfall per month:\t" << rain/years/12 << endl;

**return** 0;

}

#### 6. Population (11) Write a program that will predict the size of a population of organisms. The program should ask the user for the starting number of organisms, their average daily population increase (as a percentage), and the number of days they will multiply. A loop should display the size of the population for each day.

#### Input Validation: Do not accept a number less than 2 for the starting size of the population. Do not accept a negative number for average daily population increase. Do not accept a number less than 1 for the number of days they will multiply.

#include <iostream>

#include <iomanip>

#include <cmath>

**using namespace** std;

**int** main() {

**int** start, duration;

**double** rate100;

cout << "Starting number of organisms:\t";

**do** {

cin >> start;

**if** (start < 2)

cout << "Starting organisms cannot be smaller than 2, enter again.\n";

} **while** (start < 2);

cout << "Daily population increase: (2% then enter 2)\t";

**do** {

cin >> rate100;

**if** (rate100 < 0)

cout << "Average daily population increase cannot be negative, enter again.\n";

} **while** (rate100 < 0);

cout << "Number of days multiplied:\t";

**do** {

cin >> duration;

**if** (duration < 1)

cout << "Number of days they multiply cannot be smaller than 1, enter again.\n";

} **while** (duration < 1);

cout << fixed << setprecision(0) << noshowpoint;

cout << setw(5) << "Day" << setw(17) << "Population Size" << endl;

**for** (**int** i = 0; i < duration; i++) {

cout << setw(5) << i+1 << setw(17) << pow(1 + rate100/100, i)\*start << endl;

}

**return** 0;

}

#### 7. Population (12) In Programming Challenge 10 of Chapter 3 you were asked to write a program that converts a Celsius temperature to Fahrenheit. Modify that program so it uses a loop to display a table of the Celsius temperatures 0–20, and their Fahrenheit equivalents.

#include <iostream>

#include <iomanip>

**using namespace** std;

**int** main() {

cout << setw(10) << "Celsius" << setw(13) << "Fahrenheit" << endl;

cout << fixed << setprecision(1);

**for** (**int** i = 0; i <= 20; i++) {

cout << setw(10) << i << setw(13) << 9.0/5 \* i + 32 << '\n';

}

**return** 0;

}

## Other

#### 1. Redo the program that calculates square root value using newton method. This time you apply for statement instead of do while.

#include <iostream>

#include <iomanip>

**using namespace** std;

**int** main() {

**double** d;

cout << "Calculate square root of:\t";

cin >> d;

**double** temp = d;

cout << setprecision(20);

**for** (**int** i = 0; i < 20 ; i++) {

temp = (d/temp + temp) / 2.0;

}

cout << "SQRT(" << d << ") :\t" << temp;

**return** 0;

}

#### 2. You are chatting in the same time with 2 girls and have to make decision what girl you should make a dating. Ask the girls about: - Age: \* (<=16): -2 points \* 16 < age < 21: 5 points \* >= 21: 2 points - Height: \* taller than or equal to you: decrease 1 point \* less than you 30 cm: decrease 2 points \* else: increase 3 point The girl with higher point is chosen. In the case 2 girls get the same points – make dating with them in Saturday and Sunday.

**#include <iostream>**

**using namespace** std;

**int** main() {

**double** h, h1, h2;

**int** a1, a2;

**int** p1 = 0, p2 = 0;

cout << "Login - enter your height: (cm)\t";

**do** {

cin >> h;

**if** (h < 0 || h > 300)

cout << "Invalid height, enter again:\t";

} **while** (h < 0 || h > 300);

cout << "Hi Lan\n";

cout << "\tHow old are you?\t";

**do** {

cin >> a1;

**if** (a1 < 0 || a1 > 200)

cout << "\tInvalid age, enter again:\t";

} **while** (a1 < 0 || a1 > 200);

cout << "\tWhat\'s your height:\t";

**do** {

cin >> h1;

**if** (h1 < 0 || h1 > 300)

cout << "\tInvalid height, enter again:\t";

} **while** (h1 < 0 || h1 > 300);

cout << "Hi Mai\n";

cout << "\tHow old are you?\t";

**do** {

cin >> a2;

**if** (a2 < 0 || a2 > 200)

cout << "\tInvalid age, enter again:\t";

} **while** (a2 < 0 || a2 > 200);

cout << "\tWhat\'s your height:\t";

**do** {

cin >> h2;

**if** (h2 < 0 || h2 > 300)

cout << "\tInvalid height, enter again:\t";

} **while** (h2 < 0 || h2 > 300);

**if** (a1 <= 16) p1 -= 2;

**else if** (a1 < 21) p1 += 5;

**else** p1 += 2;

**if** (a2 <= 16) p2 -= 2;

**else if** (a2 < 21) p2 += 5;

**else** p2 += 2;

**if** (h1 >= h) p1 -= 1;

**else if** ( h - h1 > 30) p1 -= 2;

**else** p1 += 3;

**if** (h2 >= h) p2 -= 1;

**else if** ( h - h2 > 30) p2 -= 2;

**else** p2 += 3;

cout << "Your decision:\n";

**if** (p1 > p2) cout << "\tLan, are you free on Saturday.";

**else if** ( p2 > p1) cout << "\tMai, are you free on Saturday.";

**else** {

cout << "\tLan, are you free on Saturday.\n";

cout << "\tMai, are you free on Sunday.";

}

cout << endl;

**return** 0;

}

#### 3. Bank Interest

#include <iostream>

#include <iomanip>

#include <string>

**using namespace** std;

**int** main() {

string name;

**double** deposit, interest = 0.0;

**float** fy100;

cout << "Customer\'s name:\t";

getline(cin, name);

cout << "Deposit amount:\t";

**do**{

cin >> deposit;

**if** (deposit < 0)

cout << "Deposit cannot be negative, enter again.\n";

} **while** (deposit < 0);

cout << "Interest rate: (8% then enter 8)\t";

cin >> fy100;

cout << "Account Name: " << name << endl;

cout << setw(6) << "Month" << setw(15) << "Deposit"

<< setw(10) << "Interest" << setw(15) << "Total" << endl;

cout << fixed << setprecision(0) << noshowpoint;

**for** (**int** i = 1; i <= 12; i++) {

cout << setw(6) << i << setw(15) << deposit << setw(10)

<< deposit \* fy100/100/12 << setw(15) << deposit \* (1 + fy100/12/100) << endl;

deposit \*= (1 + fy100/12/100);

interest += deposit \* fy100/12/100;

}

cout << "Total Interest:\t" << interest;

**return** 0;

}

#### 4. Square patterns

**#include <iostream>**

**using namespace** std;

**int** main() {

**const int** size = 7;

cout << "a>\n";

**for** (**int** i = 0; i < size; i++) {

**for** (**int** j = 0; j < size; j++){

**if** (i == 0 || i == size -1) cout << "\* ";

**else if** (j == 0 || j == size -1) cout << "\* ";

**else** cout << " ";

}

cout << '\n';

}

cout << "b>\n";

**for** (**int** i = 0; i < size; i++) {

**for** (**int** j = 0; j < size; j++){

**if** (i == 0 || i == size -1) cout << "\* ";

**else if** (j == i) cout << "\* ";

**else** cout << " ";

}

cout << '\n';

}

cout << "c>\n";

**for** (**int** i = 0; i < size; i++) {

**for** (**int** j = 0; j < size; j++){

**if** (i == 0 || i == size -1) cout << "\* ";

**else if** (j == size - i - 1) cout << "\* ";

**else** cout << " ";

}

cout << '\n';

}

cout << "d>\n";

**for** (**int** i = 0; i < size; i++) {

**for** (**int** j = 0; j < size; j++){

**if** (i == 0 || i == size -1) cout << "\* ";

**else if** (j == size - i - 1 || j == i) cout << "\* ";

**else** cout << " ";

}

cout << '\n';

}

cout << "e>\n";

**for** (**int** i = 0; i < size; i++) {

**for** (**int** j = 0; j < size; j++){

**if** (i == 0 || i == size -1) cout << "\* ";

**else if** (j == size - i - 1 || j == i || j == 0 || j == size - 1) cout << "\* ";

**else** cout << " ";

}

cout << '\n';

}

**return** 0;

}