COMP2113 Programming Technologies

ENGG1340 Computer Programming II

Module 5 Checkpoint Exercise

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Instructions:

For each single question or each group of questions in the Checkpoint exercise, please type your answer right after the question in this Word document.

**Checkpoint 5.1 (Please submit your answer to Moodle)**

Error(s) may include in the following sub-questions. If you think there is/are error(s), try to find out and suggest some way(s) to fix the error(s). If no error, please write “No error”.

|  |
| --- |
| #include <iostream>  using namespace std;  double multiplication(double a, double b){      int result;      result = k \* j;      return result;  }  int main(){      double result;      result = multiplication(2.5, 1.5);      cout << result << endl;      return 0;  } |

Ans: First, in function multiplication, k and j are not defined. The fix is to change `result = k \* j;` to `result = a \* b;`.

Second, the return value of the multiplication function is an integer data type instead of a floating point number, which truncates the value of the result, reducing accuracy. The fix is to change `int result;` to `double result;`.

|  |
| --- |
| #include <iostream>  using namespace std;  void a(){      a = 8;  void b(){          b = 9;          void c(){              c = 10;          }      }  }  int main(){      // calling b()      b();      return 0;  } |
|  |

Ans: First, functions b and c are defined inside function a but not in the global scope. Therefore, when we call function b() in main(), the compiler returns an error. The fix is to put both functions b and c outside of a, and each of them should not contain one another.

Second, in each function, a,b, and c, the declaration of the variable is missing the data type. The fix is to change `a = 8;` to `int a = 8;`, change `b = 9;` to `int b = 9;` and change `c = 10;` to `int c = 10;`.

The program should run fine now. However, things can be improved even though there is no error. In the future, if we want to convert any of the functions a(), b(), or c() into a recursion function, the variables int a,b, and c must change their name to something else. Since declaring `int b = 9;` will overwrite the b(), making the function b() unable to call itself. Note that for this program, it is not an error currently.

**Checkpoint 5.2 (Please submit your answer to Moodle)**

Student A writes the following code. However, when he compiles the code, some compilation errors are found.

|  |
| --- |
| #include <iostream>  using namespace std;  int main(){      int y = 9;      int x = 7;      int i = 0;      while (i < 3){          if (i % 2 == 0){              g(x);              i++;          }          else{              g(y);              i++;          }      }  }  void g(int& k){      static int num = 6;      if (k % 2 == 0){          num += 2;          k = k + 6;      }      else{          num -= 2;          k = k - 6;      }      cout << num << ", " << k << endl;  } |

a) Find out the errors and suggest some ways to fix the errors.

b) Write down the program output after you fix the errors in (a).

Ans:

1. The function g() was referenced before being declared. One possible fix is to add “void g(int& k);” before the int main() function. This technique is called function prototyping. Another possible fix is to put the “int main() { … }” function after the declaration of function “void g(int& k)”.
2. The program output is as follows:

4, 1

2, 3

0, -5

**Checkpoint 5.3 (Please submit your answer to Moodle)**

Given the following program:

|  |
| --- |
| #include <cmath>  #include <iostream>  using namespace std;  int k = 10;  void display(int m){      cout << m << endl;  }  int main(){      for (int j = 50; j >= 1; j--){          if (j % 2 == 0){              k = k + j;          }      }      display(k);      return 0;  } |

a) What is the scope of variable k?

b) What is the scope of parameter m?

c) What is the scope of variable j?

Ans:

1. The entire file
2. The entire display() function
3. From the start of for loop till the end of it, where j no longer >= 1.

**Checkpoint 5.4 (Please submit your answer to Moodle)**

Given the following program:

|  |
| --- |
| #include <iostream>  using namespace std;  void f(double &p, double &q, double r, double s){      double w;      w = q;      q = p;      p = w;      r = 10 \* p;      s = 100 \* q;  }  int main(){      double a, b, c, d;      b = 1.1;      c = 10.1;      a = 100.1;      d = 1000.1;      f(a, b, c, d);      cout << a << "\n" << b << "\n" << c << "\n" << d << endl;      return 0;  } |

a) Write down the expected program output.

b) What would be the program output if line 4 is replaced by “void f(double &p, double &q, double &r, double &s) {” ?

Ans:

1. 1.1

100.1

10.1

1000.1

1. 1.1

100.1

11

10010