**ENGG1340 Computer Programming II**

**COMP2113 Programming Technologies**

**Module 10 Checkpoint Exercises**

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**Checkpoint 10.4**

**To answer all the questions, you need to read the external links in the lecture notes first.**

1. Suggest two ways to debug a program.

* Adding print statements
* Using a debugger

1. A student wants to use the GDB debugger to debug a c++ program but the debugger fails to tell which line of the code causes the error. Identify the problem and suggest a solution to fix it.

|  |
| --- |
| $ g++ -std=c++11 main.cpp -o main |
| $ ./main  Segmentation fault (core dumped) |
| $ gdb main |
| (gdb) r  Starting program: /home/research/ra/1801/cklai/main  Program received signal SIGSEGV, Segmentation fault.  0x00005555555547d2 in main () |

Needs to be compiled with option -g:

g++ -pedantic-errors -std=c++11 -g main.cpp -o main

1. Give one advantage and one disadvantage of inserting cout statements to debug a program.

Advantage: can show variable values during the execution

Disadvantage: too much output hard to read, need to be removed later, if the program cannot be compiled there is no help

1. What is a breakpoint in the GDB debugger? How do you set a breakpoint to a program?

Breakpoint: makes the execution stops and later program can be executed line by line

Use GDB to set breakpoint: (gdb) b [line number]

1. GDB debugger is used to debug the following program. Suppose a breakpoint is set to line 12. When the program runs, it will pause at line 12. What are the values of n1 and n2 when the program pauses at the first time? Fill in the blank.

|  |
| --- |
| $ cat gcd.cpp  #include <iostream>  using namespace std;  int main()  {  int n1 = 32;  int n2 = 8;  while(n1 != n2)  {  if(n1 > n2)  n1 -= n2; // This line is line 12  else  n2 -= n1;  }  cout << "GCD = " << n1;  return 0;  } |
| $ g++ -g gcd.cpp -o gcd |
| $ gdb gcd |
| (gdb) b 12  Breakpoint 1 at 0x870: file gcd.cpp, line 12. |
| (gdb) r  Starting program: /home/research/ra/1801/cklai/gcd  Breakpoint 1, main () at gcd.cpp:12  12 n1 -= n2; |
| (gdb) p n1  $1 = 24 |
| (gdb) p n2  $2 = 8 |

1. Suppose a breakpoint is set to a certain line in a for loop in a program. The program pauses at that breakpoint when it runs on the debugger. Instead of entering the ‘n’ command multiple times, what command allows the program to resume execution and to pause at the same breakpoint in the next iteration?

continue

1. The following C program is to find the sum of Natural Numbers but it contains error(s). Fix the error(s) by modifying the code.

|  |
| --- |
| #include <stdio.h>  int main() {  int n;  int i;  int sum = 0;  printf("Enter a positive integer: ");  scanf("%d", &n);  for (i = 1; i <= n; ++i) {  sum += i;  }  printf("Sum = %d", sum);  return 0;  } |