```
(gdb) quit
wtownsend2@hpcl3-5:~/COSC350/Lab02$ gdb debugme
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04) 9.2
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This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
    <http://www.gnu.org/software/gdb/documentation/>.

For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from debugme...
(gdb) list
6         October 17, 2002
7       */
8
9       #include <stdio.h>
10
11      /* print a given string and a number in a pre-determined format. */
12      void
13      print_string(int num, char* string)
14      {
15          printf("String '%d' - '%s'\n", num, string);
(gdb) list 1
1       /*
2         debugme.c
3         Programming for use in gdb tutorial
4         Based on Little Unix Programmer's Group tutorial
5         Thomas Anastasio
6         October 17, 2002
7       */
8
9       #include <stdio.h>
10
(gdb) list
11      /* print a given string and a number in a pre-determined format. */
12      void
13      print_string(int num, char* string)
14      {
15          printf("String '%d' - '%s'\n", num, string);
16      }
17
18      int
19      main(int argc, char* argv[])
20      {
(gdb) list
21          int i;
22
23          /* check that there's at least one command line argument */
24          if (argc < 2)
25            {
26              printf("Usage: %s [<string> ...]\n", argv[0]);
27              exit(1);
28            }
29
30          /* loop over each argv[i], print them one by one */
(gdb) run 'hi there' ' bye bye'
Starting program: /mnt/linuxlab/home/wtownsend2/COSC350/Lab02/debugme 'hi there' ' bye bye'
String '0' - '/mnt/linuxlab/home/wtownsend2/COSC350/Lab02/debugme'
```

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```
Starting program: /mnt/linuxlab/home/wtownsend2/COSC350/Lab02/debugme 'hi there' ' bye bye'
String '0' - '/mnt/linuxlab/home/wtownsend2/COSC350/Lab02/debugme'
String '1' - 'hi there'
String '2' - ' bye bye'
Total number of command-line arguments: 2
[Inferior 1 (process 101029) exited normally]
(gdb) list
31          for (i = 0; i < argc; i++)
32            {
33              print_string(i, argv[i]);
34            }
35
36          printf("Total number of command-line arguments: %d\n", argc - 1);
37
38          return 0;
39      }
(gdb) break 33
Breakpoint 1 at 0x5555555551e0: file debugme.c, line 33.
(gdb) next
The program is not being run.
(gdb) run 'hi there' 'bye bye'
Starting program: /mnt/linuxlab/home/wtownsend2/COSC350/Lab02/debugme 'hi there' 'bye bye'

Breakpoint 1, main (argc=3, argv=0x7fffffffe518) at debugme.c:33
33              print_string(i, argv[i]);
(gdb) next
String '0' - '/mnt/linuxlab/home/wtownsend2/COSC350/Lab02/debugme'
31          for (i = 0; i < argc; i++)
(gdb) next

Breakpoint 1, main (argc=3, argv=0x7fffffffe518) at debugme.c:33
33              print_string(i, argv[i]);
(gdb) next
String '1' - 'hi there'
31          for (i = 0; i < argc; i++)
(gdb) next

Breakpoint 1, main (argc=3, argv=0x7fffffffe518) at debugme.c:33
33              print_string(i, argv[i]);
(gdb) next
String '2' - 'bye bye'
31          for (i = 0; i < argc; i++)
(gdb) next
36          printf("Total number of command-line arguments: %d\n", argc - 1);
(gdb) next
Total number of command-line arguments: 2
38          return 0;
(gdb) next
39      }
(gdb) next
__libc_start_main (main=0x555555555199 <main>, argc=3, argv=0x7fffffffe518, init=<optimized out>, fini=<optimized out>,
    rtld_fini=<optimized out>, stack_end=0x7fffffffe508) at ../csu/libc-start.c:342
342     ../csu/libc-start.c: No such file or directory.
(gdb) next
[Inferior 1 (process 101037) exited normally]
(gdb) info break
Num     Type           Disp Enb Address            What
1       breakpoint     keep y   0x00005555555551e0 in main at debugme.c:33
        breakpoint already hit 3 times
(gdb) delete 33
No breakpoint number 33.
(gdb) break 33
Breakpoint 2 at 0x7ffff7dd5fc0: file ../csu/libc-start.c, line 137.
(gdb) run 'hi there' ' bye bye'
Starting program: /mnt/linuxlab/home/wtownsend2/COSC350/Lab02/debugme 'hi there' ' bye bye'
```

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```
Breakpoint 1 at 0x11e0: file debugme.c, line 33.
(gdb) run 'hi there' 'bye bye'
Starting program: /mnt/linuxlab/home/wtownsend2/COSC350/Lab02/debugme 'hi there' 'bye bye'

Breakpoint 1, main (argc=3, argv=0x7fffffffe518) at debugme.c:33
33              print_string(i, argv[i]);
(gdb) step
print_string (num=21845, string=0x7fffffffe406 "") at debugme.c:14
14      {
(gdb) print num
$1 = 21845
(gdb) print string
$2 = 0x7fffffffe406 ""
(gdb) print i
No symbol "i" in current context.
(gdb) print argv
No symbol "argv" in current context.
(gdb) quit
A debugging session is active.

        Inferior 1 [process 104283] will be killed.

Quit anyway? (y or n) y
wtownsend2@hpcl3-5:~/COSC350/Lab02$ g++ -c arrayTest arrayTest.c
g++: error: arrayTest: No such file or directory
g++: error: arrayTest.c: No such file or directory
g++: fatal error: no input files
compilation terminated.
wtownsend2@hpcl3-5:~/COSC350/Lab02$ g++ -c arrayTest arrayTest.cpp
g++: error: arrayTest: No such file or directory
wtownsend2@hpcl3-5:~/COSC350/Lab02$ g++ -o arrayTest arrayTest.cpp
wtownsend2@hpcl3-5:~/COSC350/Lab02$ ./arrayTest
Enter an array index: 7
arr[7] = 622273053
wtownsend2@hpcl3-5:~/COSC350/Lab02$ ./arrayTest
Enter an array index: 23
arr[23] = 764485887
wtownsend2@hpcl3-5:~/COSC350/Lab02$ ./arrayTest
Enter an array index: 454545
Segmentation fault (core dumped)
wtownsend2@hpcl3-5:~/COSC350/Lab02$ gdb arrayTest
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04) 9.2
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For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from arrayTest...
(No debugging symbols found in arrayTest)
(gdb) run
Starting program: /mnt/linuxlab/home/wtownsend2/COSC350/Lab02/arrayTest
Enter an array index: 3245

Program received signal SIGSEGV, Segmentation fault.
0x00005555555552f3 in computeVal(int*, int) ()
(gdb) exit
```

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```
wtownsend2@hpcl3-5:~/COSC350/Lab02$ gdb fact
GNU gdb (Ubuntu 9.2-0ubuntu1~20.04) 9.2
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Find the GDB manual and other documentation resources online at:
    <http://www.gnu.org/software/gdb/documentation/>.

For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from fact...
(gdb) break 23
Breakpoint 1 at 0x124a: file facDemo.cpp, line 23.
(gdb) run
Starting program: /mnt/linuxlab/home/wtownsend2/COSC350/Lab02/fact
Enter positive integer (0 < i < 10): 4

Breakpoint 1, main () at facDemo.cpp:23
23        factNumb = factorial(number);
(gdb) step
factorial (n=272211130) at factorial.cpp:12
12      {
(gdb) next
15        if (n == 0)
(gdb) next
17        if (n == 1)
(gdb) next
19        thisval = factorial(n - 1);  // isolate the call on one line
(gdb) step
factorial (n=0) at factorial.cpp:12
12      {
(gdb) next
15        if (n == 0)
(gdb) next
17        if (n == 1)
(gdb) next
19        thisval = factorial(n - 1);  // isolate the call on one line
(gdb) step
factorial (n=272211130) at factorial.cpp:12
12      {
(gdb) next
15        if (n == 0)
(gdb) next
17        if (n == 1)
(gdb) next
19        thisval = factorial(n - 1);  // isolate the call on one line
(gdb) step
factorial (n=0) at factorial.cpp:12
12      {
(gdb) backtrace
#0  factorial (n=0) at factorial.cpp:12
#1  0x0000555555555353 in factorial (n=2) at factorial.cpp:19
#2  0x0000555555555353 in factorial (n=3) at factorial.cpp:19
#3  0x0000555555555353 in factorial (n=4) at factorial.cpp:19
#4  0x0000555555555254 in main () at facDemo.cpp:23
(gdb)
```

```
(gdb) backtrace
#0  factorial (n=0) at factorial.cpp:12
#1  0x0000555555555353 in factorial (n=2) at factorial.cpp:19
#2  0x0000555555555353 in factorial (n=3) at factorial.cpp:19
#3  0x0000555555555353 in factorial (n=4) at factorial.cpp:19
#4  0x0000555555555254 in main () at facDemo.cpp:23
(gdb) run
The program being debugged has been started already.
Start it from the beginning? (y or n) y
Starting program: /mnt/linuxlab/home/wtownsend2/COSC350/Lab02/fact
Enter positive integer (0 < i < 10): 9

Breakpoint 1, main () at facDemo.cpp:23
23        factNumb = factorial(number);
(gdb) step
factorial (n=1193357780) at factorial.cpp:12
12      {
(gdb) print n
$1 = 1193357780
(gdb) set n=5
Argument must be preceded by space.
(gdb) set variable n = 5
(gdb) delete
Delete all breakpoints? (y or n) y
(gdb) continue
Continuing.
9! = 362880
[Inferior 1 (process 115027) exited normally]
(gdb)
```