ICS 233 – Fall 2009

Computer Architecture and Assembly Language

Programming Assignment 1

Problem 1: Greatest Common Divisor (GCD)

The greatest common divisor of two integers is the largest integer that will evenly divide both integers. The GCD algorithm involves integer division in a loop, described by the following code:

```
int GCD(int x, int y) {
   x = abs(x);          // absolute value
   y = abs(y);
   do {
      int n = x % y;    // n = remainder of dividing x by y
      x = y;
      y = n;
   } while (y > 0);
   return x;
}
```

Write a MIPS assembly language program that does the following:

Ask the user to enter two integers *x* and *y*, compute and display the GCD, then ask the user whether he wants to repeat the program. Use the **`divu`** instruction to do the unsigned division and the **`mfhi`** instruction to move the remainder of the division to a general-purpose register. You can also use the **`remu`** pseudo-instruction that will compute the remainder of unsigned division.

Problem 2: Searching a String

Write a MIPS assembly language program to do the following:

Read a string and store it in memory. Limit the string length to 100 characters. Then, ask the user to enter a character. Search and count the number of occurrences of the character in the string. The search is not case sensitive. Lowercase and uppercase letters should be equal. Then ask the user to enter a string of two characters. Search and count the number of occurrences of the two-character string.

```
Enter a string of at most 100 characters: MIPS programming is nice
Enter a character: i
Number of occurrences of i = 4
Enter a string of two characters: mi
Number of occurrences of mi = 2
Repeat (Y/N)? n
```

Submission Guidelines:

All submissions will be done through WebCT. Submit the source code of the program. Make sure that your program is well documented.

Late Policy:

The programming assignment should be submitted on the due date by midnight. Late submissions are accepted for a maximum of 3 late days, but will be penalized. Assignments submitted after 3 late days will not be accepted.