INEL 4206 – Microprocessors

Problem Set 2 – Due Friday March 8, 2002

1. In class we discussed the implementation of an algorithm to perform division of integers by repeated subtraction. The code in C follows:

```
int a = 12;
int b = 3;
int res = 0;
main() {
  while (a >= b) {
    a = a - b;
    res ++;
  }
}
```

   a. Modify the algorithm to perform multiplication by repeated addition. Code your algorithm in both C language and in SPIM assembly language. Test both implementations using the C compiler and the SPIM simulator.

   b. Add code to both your C and SPIM versions of the algorithm from (a) to compute the product of all pairs of integers between zero (0) and some hard-coded constant n. Work on the C version first.

   c. Modify both versions of your algorithm to print a nicely formatted multiplication table.

   d. Use procedures to modularize the multiplication operation in both the C and the SPIM versions. You must define a procedure *mult* that performs multiplication of two global variables and places the result in a third global variable. The function will not have parameters and should not return any values. Re-write the source code in part (c) to make use of the procedure.

   Please submit the source code for each part of the question separately.