Factorial Program:

- C Program

```c
#include <stdio.h>
int main()
{
    int i;
    int j;
    int fact = 1;
    int temp;
    int num = 5;    /* hold what factorial you want */
    for (int i = num; i >= 2; i--)
    {
        temp = fact;
        for (int j = i; j >= 2; j--)
        {
            fact = fact + temp;
        }
    }
    printf("fact: %d\n", fact);
    return 0;
}
```

- Assembly code

```
xor  x0, x0, 0      # ref       I   0       00004033
change 8 in machine code to any number you want to get its factorial.
addi x1, x0, 8      # i         I   4       00500093
addi x2, x0, 1      # j         I   8       00100113
addi x3, x0, 1      # fact      I   12      00100193
addi x7, x0, 0      # temp      I   16      00000393
addi x8, x0, 1      # const=1   I   20      00100413
addi x9, x0, 2      # const=2   I   24      00200493

loop1:
    blt  x1, x9, end        #   B   28      0290C263
    addi x7, x3, 0          #   I   32      00018393
    addi x2, x1, 0          #   I   36      00008113

lable:
    blt x2, x9, endloop     #   B   40      00914863
    add x3, x3, x7          #   R   44      007181B3
    sub x2, x2, x8          #   I   48      40810133
    beq x9, x9, lable       #   B   52      FE948AE3
```

```
endloop:
    sub x1, x1, x8          #   I   56      408080B3
    beq x9, x9, loop1       #   B   60      FE9480E3

end:
sw x3, 0(x0)                #   S   64      00300023
```

- Machine Code:

```
00004033
00800093
00100113
00100193
00000393
00100413
00200493
0290C263
00018393
00008113
00914863
007181B3
40810133
FE948AE3
408080B3
FE9480E3
00300023
00000000
```

Note: result stored in first word in data memory (data_mem[0])

- Simulation Result: