CS3021/3421 Tutorial 2

Consider the following C/C++ code segment:

```
_int64 g = 4;

_int64 min(_int64 a, _int64 b, _int64 c) {
    _int64 v = a;
    if (b < v)
        v = b;
    if (c < v)
        v = c;
    return v;
}

_int64 p(_int64 i, _int64 j, _int64 , k, _int64 l) {
    return min(min(g, i, j), k, l);
}

_int64 gcd(_int64 a, _int64 b) {
    if (b == 0) {
        return a;
    } else {
        return gcd(b, a % b);
    }
}

_int64 q(_int64 a, _int64 b, _int64 c, _int64 d, _int64 e) {
    _int64 sum = a + b + c + d + e;
    printf("a = %I64d b = %I64d c = %I64d d = %I64d e = %I64d sum = %I64d\n", a, b, c, d, e, sum);
    return sum;
}
```

Q1. Translate the code segment above into x64 assembly language using the basic code generation strategy outlined in lectures. The % operation can be implemented using the x64 cqo and idiv instructions

Q2. Draw a diagram showing the state of the stack at its maximum depth during the calculation of gcd(14, 21).

Q3. Using Visual Studio (or equivalent), create an x64 console application with files t2.h and t2.asm containing the x64 assembly language for min, p, gcd and q. Write C++ code to test min, p, gcd and q [see t2Test.cpp]. Hand in listings of your code files and a screen dump of the console window showing the results of your program.

Q4. Write a simple assembly language function that demonstrates that shadow space needs to be allocated when calling printf.