

## CS3021 Tutorial 1

**Q2:** Stack of 4 frames deep

b = 21
a = 14
Return address
Saved ebp
b = 14
a = 21
Return address
Saved ebp
b = 7
a = 14
Return address
Saved ebp
b = 0
a = 7
Return address
Saved ebp

**Q3:** This is a statement that my program builds, runs and satisfies all tests. See the relevant screen shots. The files have also been included in the submission.

**t1.h:**

```
extern "C" int g; // external global variable g

extern "C" int _cdecl min(int, int, int);
extern "C" int _cdecl gcd(int, int);
extern "C" int _cdecl p(int, int, int, int);
```

**t1.asm:**

```
.686
.model flat, C
option casemap:none

.data
    public g
    g DWORD 4

.code
```

public min

```
min:      push    ebp
          mov     ebp, esp
          sub     esp, 4

          mov     eax, [ebp+8]
          mov     [ebp-4], eax

          mov     eax, [ebp+12]
          cmp     eax, [ebp-4]
          jge     greater1

          mov     [ebp-4], eax

greater1:  mov     eax, [ebp+16]
          cmp     eax, [ebp-4]
          jge     greater2
          mov     [ebp-4], eax

greater2:  mov     eax, [ebp-4]
          mov     esp, ebp
          pop     ebp
          ret     0
```

public p

```
p:        push    ebp
          mov     ebp, esp

          push    [ebp+12]
          push    [ebp+8]
          push    g
          call    min
```

```
add    esp, 12
push   [ebp+20]
push   [ebp+16]
push   eax
call   min
add    esp, 12

mov    esp, ebp
pop    ebp
ret    0
```

public gcd

```
gcd:      push    ebp
          mov     ebp, esp

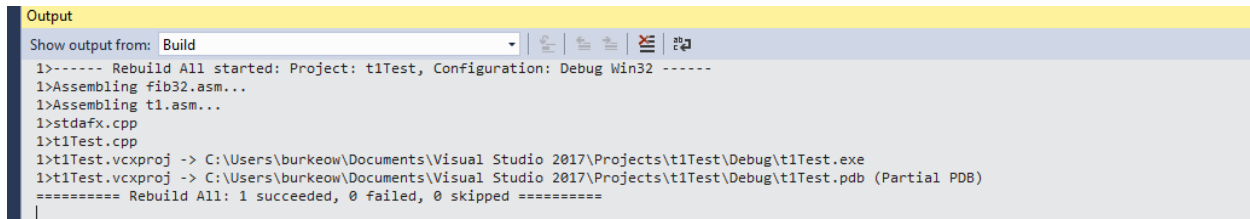
          mov     ecx, [ebp+12]
          cmp     ecx, 0
          je      setResult
          mov     ecx, [ebp+12]
          mov     eax, [ebp+8]
          cdq
          idiv    ecx
          mov     ecx, [ebp+12]
          push    edx
          push    ecx
          call    gcd
          add     esp, 8
          jmp     returnFunc

setResult:
          mov     eax, [ebp+8]

returnFunc:
          mov     esp, ebp
          pop     ebp
          ret     0
```

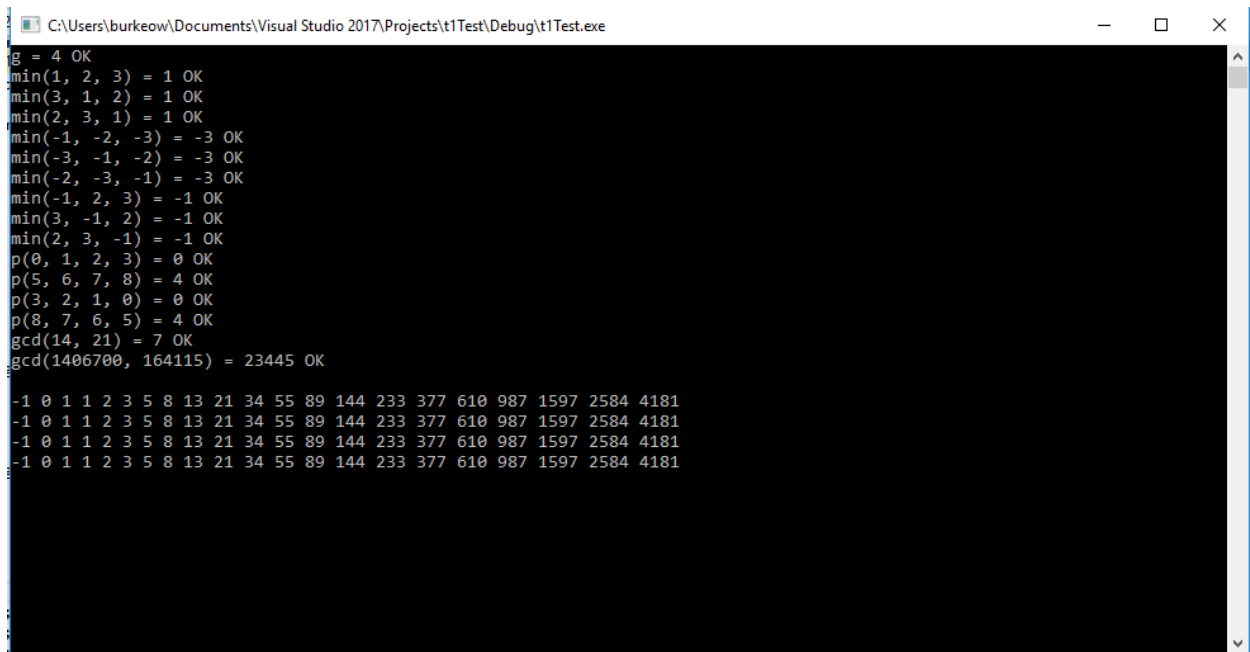
end

## Build Screenshot:



```
Output
Show output from: Build
1>----- Rebuild All started: Project: t1Test, Configuration: Debug Win32 -----
1>Assembling fib32.asm...
1>Assembling t1.asm...
1>stdafx.cpp
1>t1Test.cpp
1>t1Test.vcxproj -> C:\Users\burkeow\Documents\Visual Studio 2017\Projects\t1Test\Debug\t1Test.exe
1>t1Test.vcxproj -> C:\Users\burkeow\Documents\Visual Studio 2017\Projects\t1Test\Debug\t1Test.pdb (Partial PDB)
===== Rebuild All: 1 succeeded, 0 failed, 0 skipped =====
```

## Console Screenshot:



```
C:\Users\burkeow\Documents\Visual Studio 2017\Projects\t1Test\Debug\t1Test.exe
g = 4 OK
min(1, 2, 3) = 1 OK
min(3, 1, 2) = 1 OK
min(2, 3, 1) = 1 OK
min(-1, -2, -3) = -3 OK
min(-3, -1, -2) = -3 OK
min(-2, -3, -1) = -3 OK
min(-1, 2, 3) = -1 OK
min(3, -1, 2) = -1 OK
min(2, 3, -1) = -1 OK
p(0, 1, 2, 3) = 0 OK
p(5, 6, 7, 8) = 4 OK
p(3, 2, 1, 0) = 0 OK
p(8, 7, 6, 5) = 4 OK
gcd(14, 21) = 7 OK
gcd(1406700, 164115) = 23445 OK
-1 0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181
-1 0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181
-1 0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181
-1 0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181
```