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| **Application/ Program name:** | L2-3 |
| **Written by:** | Bailey Nichols |

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| **Purpose or problem definition:** |
| The purpose of this program is to answer a prompt from my professor, to demonstrate the use of recursion in C++. The question or prompt is, "How many times has the Ackermann Function been recursively called when m = 3 and n = 5" (see formula shown in in notes below) |
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| **Program Procedures:** |
| Using the Ackermann function (A(m, n) and the recursive counting Ackermann function (RA(m, n)) as defined in the header file, the program will accept user input in the form of two integers between 1 and 5 and then count and return to the user the number of recursions. |
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| **Algorithm/Processing/Conditions:** |
| **Inputs:** |
| Two integers between 1 and 5. |
| **Processes:** |
| * Ackermann Function * Recursive Counting Ackermann * Error Ckecking |
| **Outputs:** |
| The number of recursions .  Prompts for user:   * "L2-3.exe\tBailey Nichols\tCIS022" * "Please enter a positive intiger to be used as M\n//>>:: " * "Please enter a positive intiger to be used as N\n//>>:: " * "It returned the value: " * "Failed input "<< n <<" is too large or small" * "failed input, stream in fail state" |
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| **Notes & Restriction:** |
| Ackermann Function as defined by the handout  A(m, n) = { n+1= number if m=0 }  { A(m-1, 1)= number if n=0 }  { A(m-1, A(n, n-1)) = number otherwise }  Recursive Counting Ackermann as defined by Stack Exchange user Peter Košinár  RA(m, n) = {1 for m=0 }  {1 + RA(m-1, 1) for m>0 and n=0}  {1 + RA(m, n-1) + RA(m-1,A(m,n-1)) for m>0 and n>0}  References:     * Košinár, Peter *Ackermann function - how to calculate the number of times it calls itself,* Stack Exchange, November 28, 2017 <https://math.stackexchange.com/questions/2511594/ackermann-function-how-to-calculate-the-number-of-times-it-calls-itself> * Brailsford, David, *The Most Difficult Program To Compute*, Computerphile YouTube July 1, 2014 <https://www.youtube.com/watch?v=i7sm9dzFtEI&t=301s> |
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| **Comments:** |
| Took me like 2 weeks to understand the function and I didn’t until I watched a video on youtube. |