System Research Skills Assessment

1. Using C/C++, write a program taking in an input value N and generate a singly linked list of the first N numbers of the Fibonacci sequence. The linked list structure must have the following functions:

- `void print(int k)`: Print to the console the first k nodes of the linked list. If $k \geq N$ then print out N values.
- `LinkList* deep_clone()`: Return a new linked list object carrying the same value in the original linked list object.

How can you quickly verify that the cloned linked list object is not the original linked list object?
(Note: Existing structures from the std library is not allowed for this question)

Submission:

- Source code a single .cpp file.
- Report: a .pdf file with screenshots of the outputs to the console.

2. Given a list of n integers, to find maximum or minimum, one would do n-1 comparisons for each answer. That means one must do 2n-2 comparisons in total. Propose a better approach that uses less than 2n-2 comparisons to find both maximum and minimum. You will submit a PDF.

3. Write a bash script to collect the processor (in percentage) and memory (in MB) usage of 2 DaCapo benchmarking programs (dacapobench/dacapobench: The DaCapo benchmark suite (github.com)). The numbers are collected every 2 seconds. The programs must run for at least 1 minute. Use larger inputs if the programs finish too early. Direct all console outputs to a .log file.

Submission:

- A .sh bash script file.
- A .log file containing all console outputs.

Please upload your answers to Google Drive or Github and send a link to tiendat.ng.cs@tamu.edu.