ECE 4960
Programming Assignment – 3
Parameter extraction from least-square fitting

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Goal: The goal of the assignment is to perform least-square fitting and parameter extraction through two methods: quasi-Newton method and Secant method

Code Structure:
The parent directory contains following files:

- Code Files:

1. Assignment3_Header.h: It is a global header file included in all code files, containing globally defined functions and other classes declataions.
   Class Global_Functions: Global class defined in the header file containing functions to create dynamically allocated matrix from an ar ray, create dynamic arrays, create full matrix from sparse etc. Exception handling check is added in all functions under a macro EXCEPTION_ HANDLING
2. Assignment3_Main.cpp: Main file performing all the required tasks by calling respective class methods
3. full_Matrix_Solver.cpp: Code file to implement direct matrix solver through partial row pivoting and LU decomposition
4. EKV_Model.cpp: Implements the main file to perform quasi-Newton method to find best fit of Is, K and Vth
5. EKV_Model_Secant.cpp: Implements the main file to perform Secant method to find best fit of Is, K and Vth

- Report documents:

1. Report.pdf and Report.docx: Documentation of code design and testing strategies
2. Readme.txt: File describing code structure, compilation command and testing platforms
3. Output_MacOS.txt: Log output on MacOS

- Data:

1. Task-3.png: Plot of Vds vs Ids for different values of Vgs

Model details:

1. quasi-Newton method
- Initial guess: Is = 10^{-7}A, k = 1, V^{th} = 1V
- Number of iterations = 277
2. Secant method
- Initial guess: Is = 10^{-7}A, k = 1, V^{th} = 1V
- Number of iterations = 3

	I_s	K	V_{th}	$\|\|V\|\|$	$\|\|\Delta\|\|$	ΔS_{IS}	ΔS_k	ΔS_{Vth}
Task-4 quasi-Newton	3.0001×10^{-8}	0.7725	2.06415	1.34×10^{-8}	8.31×10^{-6}	5.14×10^{-6}	9.42×10^{-6}	7.31×10^{-7}
Task-4 Secant	-3.385×10^{-7}	-0.505	-0.037	6.27×10^{-7}	4.94×10^{-6}	3.32×10^{-6}	4.31×10^{-6}	6.34×10^{-7}