

EE3002/IM2002 Microprocessors Assignment, Special Term 2020

Name: _____ (full registered name)

Matric No: _____

Tutorial Group: _____

Instructions

1. **PLEASE DO NOT COPY FROM ONE ANOTHER. PLAGIARISM IS A VERY SERIOUS OFFENCE.**
2. This assignment constitutes **20% of the overall grade.**
3. There are 2 questions. You must answer both questions.
4. This is an individual assignment.
5. You need to submit the following:
 - a) A copy of your program
 - b) A short-written report (in words format), between 100 to 200 words, for each question reflecting on your approach, implementation and conclusions.
6. **Important:** Name your files with your family surname first and then the initials of the other names, follow by your tutorial group and question number, eg. Tan Ah Kow in EE01 tutorial group for Q1 as "TanAK_EE01_Q1prog.s" and "TanAK_EE01_Q1rpt.docx"
7. Compress all your files into one file and name it as in instruction (6), eg. "TanAK_EE01".
8. Please submit your compressed file to the course website by **10th July 2020.**
9. Please Click on "Assignments/submission" folder and upload your file.

Question 1

A block of memory contains 50 random words of data. Assume that the values are in two's complement representations and are stored in the R/W memory area. You need to provide the 50 random words and to include them in an initialization file: assign2.ini. Write a program using the ARM assembly programming language to do the following:

- a) You are required to reverse the word order in a block of 50 random words (Hint: the last word stored in the memory becomes the first and vice versa).

- b) Next, find the minimum and maximum value in the 50 random words of data.

(10 marks)

Question 2

- a) Write a subroutine using the ARM assembly programming language to construct tables of 20 ($n = 0, 1, 2, \dots, 19$) 32-bit data. There are 2 inputs to the subroutine. One is an option and the other is the starting address of the table to be constructed. There are 2 possible options: 1 or 2. This option will dictate how you should construct the table. This is shown as followed:

option = 1: Build a table of an arithmetic sequence numbers. This sequence has a difference of 3 between each number. The pattern is continued by adding 3 to the last number each time, like this: 1, 4, 7, 10, 13, 16, 19, 22, 25, ... Assume that the first number is 1.

option = 2: Build a table of a geometric sequence numbers. This sequence has a factor of 3 between each number. The pattern is continued by multiplying by 3 to the last number, like this: 1, 3, 9, 27, 81, 243, ... Assume that the first number is 1.

- b) Write the main program using the ARM assembly programming language to call the subroutine written in part (2a). The main program needs to provide the 2 inputs to the subroutine: an option and the starting address of the table to be constructed.

Hint: you need to use the key concepts of table generation, jump table and subroutine.

(10 marks)