Marks and Grades Project

This project uses the HCS12 to allow for user input of class grades to determine the letter grade and overall GPA for all classes.

Interface:

- The left-most DIP switch (SW1) is used to disable the LEDs. The "on" position will allow the LEDs to turn on as specified below.

- Four pushbuttons are used to initiate and complete grade entry. SW2 allows for the Math grade, SW3 for Science, SW4 for Physics and SW5 for English. Pressing a pushbutton always causes the specified action to occur immediately, without waiting for the pushbutton to be released. De-bounced and non-repetitive. Multiple simultaneous pushbutton presses should result in only one recorded press, the first one.

- Keypad allows for grade entry. De-bounced and non-repetitive. Multiple simultaneous pushbutton presses should result in only one recorded press, the first one.

- Four LEDs are used for indicating the grade after it is input. PB7-PB4 come on when the grade is an A, PB6-PB4 on for a B, PB5-PB4 on for a C, PB4 on for a D, and none on for an F. During all other times, the LEDs should be off.

- The left 7 segment digit shows the grade input from the keypad after it is submitted displayed as a letter grade. 100-90 is an A, 89-80 is a B, 79-70 is a C, 69-60 is a D, and below 60 is an F. The digit should be displayed only after grade submission.

- LCD displays prompts for guiding the user, using either one or two lines as necessary. The displayed message remains on until specifically changed in a later step. The LCD also displays the calculated GPA.

Logic:

- Initialization: system state begins with the LCD displaying "GPA = #.#" on the first line and "Select a course" on the second line (# represents a decimal number). This is also referred to as the idle state. Each course should be initialized with a grade of 0. Thus, the initial GPA will be 0.0.

- Starting grade entry: during the idle state, the pushbuttons may be used to initiate entering the grade for each respective course. Once the pushbutton is pressed, the LCD should display "Enter ____ grade", where _____ represents the course selected. For example, if SW3 is pressed, the LCD should display "Enter Science grade".

- The grade is entered using the keypad using the functional requirements given previously. The keypad is sampled continuously for each part of the decimal grade (for 94, 9 is entered

first and 4 is entered last). Digits can be continuously added until the pushbutton for that course is pressed (eg. for Science, the grade is input and followed by a press of SW3).

- If the grade is valid (meaning it is in the range of 0-100), the letter grade should be shown on the left 7 segment (right 7 segment is always off) and the LEDs should display accordingly. The LEDs and 7 segment displays should be on for 2 seconds, and then turn off. The state should revert back to the idle state.

- If the grade is invalid, the LCD should display "Grade not valid" for 2 seconds, and prompt for re-entry of the grade.

- GPA calculations should be done after the grade is input for the course. Each course is weighted the same and is on the normal 4.0 scale. Again, each course is initialized with a grade of 0. There are only four courses.