1. [50 points] In this HW, you are asked to create a reconfigurable circuit for a game! The game in suggestion here is inspired by the BrainTuner application for iPhone. In this game the DE2 board will prompt you with simple arithmetic calculations and their results, and you are required to indicate whether the result is correct or not. You will use the pushbuttons to indicate whether the result of an operation is right or wrong. If you are correct, the DE2 board will light a green light. If you are wrong, the board will light a red light and penalize you 5 seconds. At all time, the board will also display a 2-digit timer in seconds as the questions are being prompted. Your final score is your time.
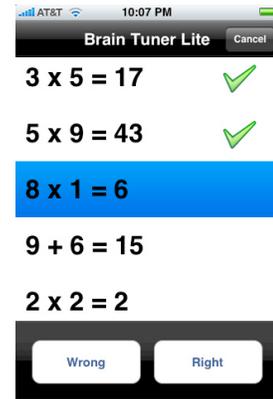
The game should be challenging by posing questions that trick you in answering them incorrectly especially that you are under time stress to finish quickly. For example, notice the "trickery" of the following random questions, where an incorrect answer is not "far" from the correct answer:

- 4 * 8 = 36
- 3 – 1 = 6
- 2 – 5 = 3
- 5 * 8 = 40
- 10 - 6 = -4
- 7 * 5 = 32
- 2 * 2 = 2
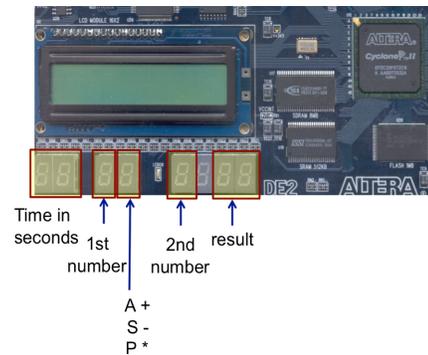
To manage the 7-segment displays, the figure shows the recommended layout. You will only use signal digit operands and three operations only (+, -, *). The result can occupy with the negative sign at most two 7-SEG. At the end of the game, only the final time will be displayed. At any time (whether during or at the end), you can press a reset button to start playing all over again (obviously with different sets of questions).

Deliverables include:
- o Email: entire Quartus II project as usual.
- o Written documentation includes:
  - ▪ Report the amount of logic and routing area utilized in the FPGA
  - ▪ Snapshot of the final layout of the FPGA as produced by the synthesis tool
  - ▪ Verilog source code with comments
- o 5 points will be allocated to games that work smoothly in an entertaining manner.