1. What are the three stages of the ARM Pipeline?

2. How is a branch instruction handled by the pipeline?

3. The ARM is a load and store architecture. What does this mean?

4. What is the difference between an ARM instruction, a THUMB instruction, and a THUMB2 instruction?

5. What is the purpose of the phase locked loop on the ARM processor?

6. What are the general characteristics of RISC processors?

7. On reset how are the GPIO pins defined on the ARM? Why?

8. For the Keil ARM environment what is the significance of the Startup file and the System which can be appended to each C program?

9. ARM machine *Thumb* code has the format shown in the figure below. The instructions are all the same length and have a uniform format. Why?

![ARM Machine Thumb Code Format](image)
10. How is the Thumb, and Thumb2 register set different from the ARM register set? Why is it necessary to have multiple register sets.

11. When combining an assembly module with a C module how are parameters passed?

12. In the thumb2 assembly code some instructions can have an s appended to the end of them to change their function. For example we can write either \texttt{add r1, r2} or \texttt{adds r1, r2}. What does the s do?

13. There are two times associated with a PWM signal. What are they and how are they determined for the ARM Cortex M0 processor?

14. What is the purpose of the match registers on the ARM Cortex M0 processor?

15. The ARM Cortex M0 processor uses \textit{memory mapped I/O}. What does this mean?

16. In the ARM Cortex M0 register set, registers 13, 14, and 15 are special. What is special about them?

17. An ARM Cortex M0 assembly language program might end with the two instructions below. What do they do?
\begin{verbatim}
pop {r0-r5};
bx lr;
\end{verbatim}

\textbf{Sample programming problems:}
1. Write a program in C to count up on bits P0.0-P0.7 and simultaneously count down on bits P1.0-P1.7.

2. Write a program in C to make bit P0.6 the logical AND of bit P0.7 and P0.8.

3. Write a program in C which will rotate a single one among the bits P0.0 to P0.4. The rotation should be from lowest to highest.