Some Key Questions

Here is a summary of some key questions that you are expected to know the answers after taking this course. Quite a few of them will appear on the Midterm. You can find most of the answers directly from your notes and handouts.
Note: This is just a subset of questions, not all.

- Lecture 2
  1. What is the DSP paradigm?
  2. Why anti-aliasing filtering?
  3. Why anti-imaging filtering?

- Lecture 3
  1. What are the function units of a CPU? What does each of them do?
  2. What is the advantage of using instruction pipeline?

- Lecture 5
  1. What is the difference between "C5510 DSP" and "C5510 DSK"?
  2. What kind of peripherals are on the DSP chip? What kind of things are on the DSK but not on the DSP chip?
  3. What is the advantage of using small memory model in C programming?

- Lecture 6
  1. How are the arguments assigned to registers in mixed programming?
  2. What are the pros and cons of C and Assembly?
  3. Why use mixed C and Assembly programming?

- Lecture 8
  1. How to implement division on a fixed point DSP?
  2. Is Newton's method the only method we can use?

3. How do we compute the value of a non-polynomial function on DSP?
4. Why do we use Horner's method? What is the advantage of it?

- Lecture 9

1. What does CODEC do?
2. How does C5510 control (setup) the CODEC?
3. How does C5510 talk with the CODEC?

- Lecture 11

1. Compare the DDS with the oscillator in Lab 6, which one seems to be more preferable to you? And why?
2. To compute the THD of the sine wave generated by a DDS, why do we have to worry about the DFT size? How does it affect the THD?

- Lecture 12 & 14

1. Why 2's complement is widely used nowadays?
2. How should we prevent overflow? Which registers on C5510 should we use more in computation to reduce the chance of overflow?
3. What is the point of saturation? What do we lose from saturation? Should we saturate early in the computation or not?

- Lecture 13

1. If a filter has a symmetric or anti-symmetric impulse response, what does it tell you about this filter?
2. Why do we care about circular addressing? Does Assembly have circular addressing support? Does C have circular addressing support?

- Lecture 15

1. In filter design, most of the time we are dealing with magnitude response $|H(f)|$ or phase response $\theta(f)$?
2. Why are linear phase filters important?
3. Why are ideal filters $H(f) = |H(f)|$ not implementable in reality?

4. Is group delay a function or a value? What is the physical interpretation of group delay? i.e. what kind of information can you obtain from group delay?

- Lecture 16-20

1. What is the geometric interpretation of $H(z)$?
2. If a pole $z = re^{j\theta}$ is very close unit circle, how does it affect the frequency response? Which frequency (in Hz) does it affect most?
3. What are the pros and cons of DF1 and DF2?
4. Why do biquad decomposition? There are many ways to do biquad decomposition, why do we do it the way specified in the class? i.e. can you explain the reason behind each step of our biquad decomposition? (Why order sections from low Q poles to high Q poles? Why match the zeros to poles from high Q poles to low Q poles?)
5. Why do we use TDF2 rather than DF2 in our lab exercise?

- Lecture 21

1. Why does it make more sense to us to put $\frac{1}{N}$ at the forward DFT rather than the inverse DFT?
2. When we take N samples from a sine wave and then DFT, leakage will occur if N is not chosen appropriately. The causes of the leakage in the time domain is? And the cause in the frequency domain is?
3. Why do we care about windowing? What are the effects of windowing in the time domain and the frequency domain?

- Lecture 22-24

1. What was the main goal of FFT in the old days and why? What is the main goal of FFT algorithms on the DSP processors nowadays and why?
2. Does FFT have a higher complexity gain over the brute force DFT at small N or large N?
3. If N can be factorized, what kind of FFT algorithm can we use? If N is prime, can we have any improvement at all?
4. If we are not given IFFT routine, what can we use to obtain IDFT?

- Lecture 25
  1. What is the point of using interrupt?
  2. What are the 3 sources of interrupts?

- Lecture 26
  1. What are the advantages of oversampling in A/D and why?
  2. How does it affect the SNR of A/D?

- Lecture 27
  1. What is the advantage of sigma-delta A/D and why?
  2. How does sigma-delta affect the SNR of A/D?

- Lecture 29
  1. What is the advantage of using Assembly codes?
  2. What are the different addressing modes?
  3. Why do we need different addressing modes? i.e. for each mode, in what situation will that mode be useful?