

MAE334 Quiz 7 - November 14th

Given a data set containing 50 points collected at 100 samples/second.

1. What is the frequency spacing, Δf , of a Fourier Transform of the data set?
 - A. 50 Hz
 - B. 10 Hz
 - C. 5 Hz
 - D. 2 Hz
 - E. 0.5 Hz
2. If the input signal was a 7 Hz sine wave would there be spectral leakage or amplitude ambiguity in the frequency spectrum?
 - A. Yes
 - B. No

3. In designing an instrument system to achieve a given level of precision, it is usually most economical to choose components
- A. each of which contributes about the same amount to the overall precision error.
 - B. such that most of the precision error is contributed by one of the components.
 - C. such that the data acquisition system has the lowest precision error.
 - D. such that the sensor has the lowest precision error.
4. The zero order uncertainty of a digital pressure gauge with a display of XX.X PSI is
- A. ± 0.01 PSI
 - B. ± 0.05 PSI
 - C. ± 0.1 PSI
 - D. ± 0.2 PSI
5. If the static sensitivity of a thermocouple is 100 microvolts/ $^{\circ}\text{C}$ and the resolution of your ADC is 1 millivolt. What is the zero order uncertainty of your system?
- A. ± 0.05 $^{\circ}\text{C}$
 - B. ± 0.1 $^{\circ}\text{C}$
 - C. ± 1 $^{\circ}\text{C}$
 - D. ± 5 $^{\circ}\text{C}$
 - E. ± 10 $^{\circ}\text{C}$
6. If the above thermocouple is amplified to a new static sensitivity of 1 millivolt/ $^{\circ}\text{C}$ with an amplifier with a 1% linearity error. What is the design stage uncertainty for the system at a mean temperature measurement of 100 $^{\circ}\text{C}$?
- A. $\pm\sqrt{1^2 + 1^2}$ $^{\circ}\text{C}$
 - B. $\pm\sqrt{0.5^2 + 0.5^2}$ $^{\circ}\text{C}$
 - C. $\pm\sqrt{0.5^2 + 1^2}$ $^{\circ}\text{C}$
 - D. $\pm\sqrt{1^2 + 2^2}$ $^{\circ}\text{C}$