

Q.1 (11.7 of J&K)

The following measurements are found from a 3-bit unipolar DAC with $V_{\text{ref}} = 8 \text{ V}$:
(-0.01, 1.03, 2.02, 2.96, 3.95, 5.02, 6.00, 7.08). In units of LSBs, find the offset error, gain error, maximum DNL, and maximum INL.

Q.2 (11.10 of J&K)

Consider the following measured voltage values for a 2-bit DAC with a reference voltage of 4 V:

{00 ↔ 0.01 V} {01 ↔ 1.02 V} {10 ↔ 1.97 V} {11 ↔ 3.02 V}

In the units of LSB, find the offset error, gain error, worst absolute and relative accuracies, and worst differential nonlinearity. Restate the relative accuracy in terms of an N-bit accuracy.

Q.3 (11.12 of J&K)

What sampling-time uncertainty (jitter) can be tolerated for a 16-bit ADC operating on an input signal from 0–20 kHz.

Q.4

Assume you have a n-bit R-string unit-element DAC and the standard deviation of mismatch between the unit resistors is σ_u . Show:

a) $\sigma_{\text{DNL}} = \sigma_u$

b) $\sigma_{\text{INL}} = \frac{1}{2} \sigma_u \sqrt{2^n - 1}$