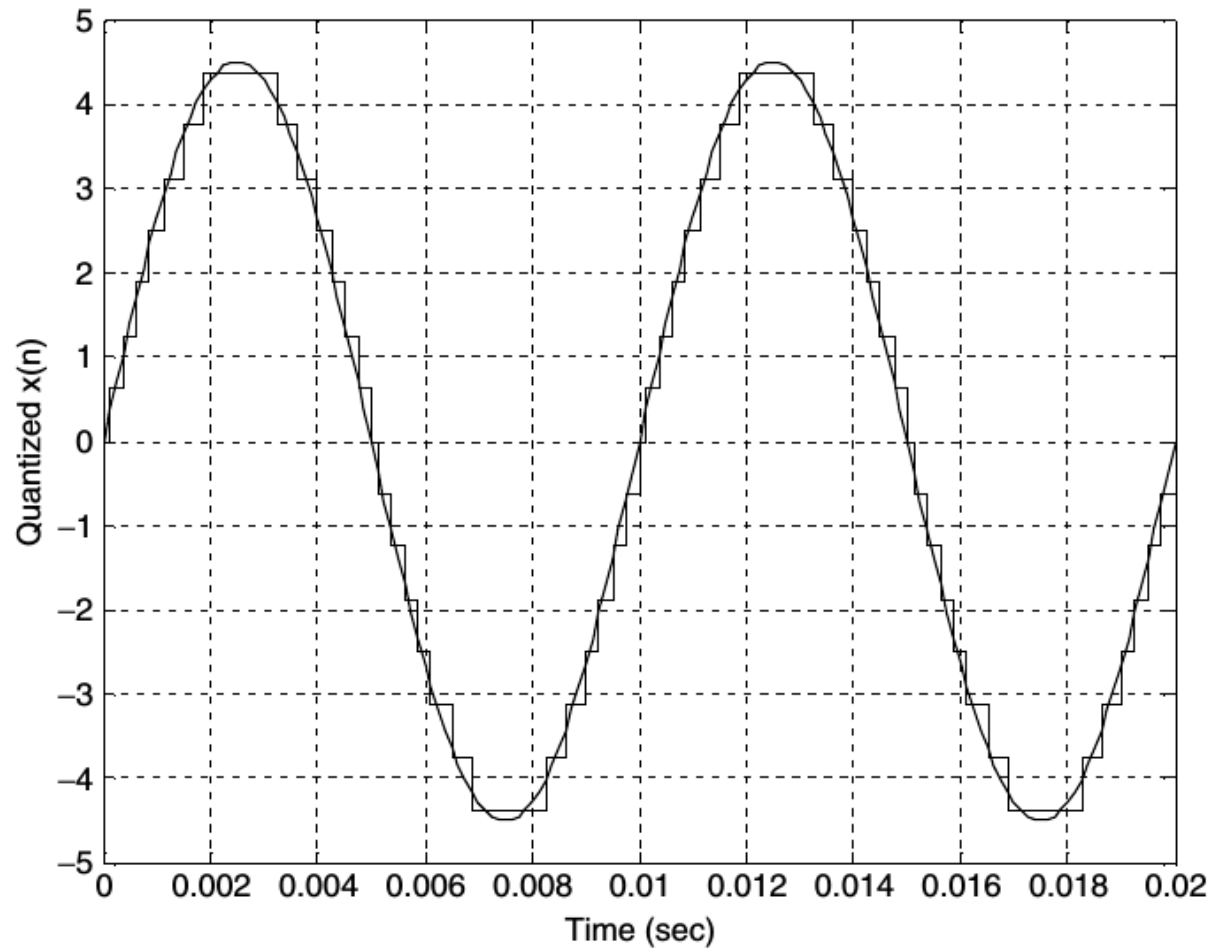




ANALOG TO DIGITAL CONVERTERS

Analog to digital



Resolution

- The resolution of an ADC is determined by the number of bits used to represent the digital number.

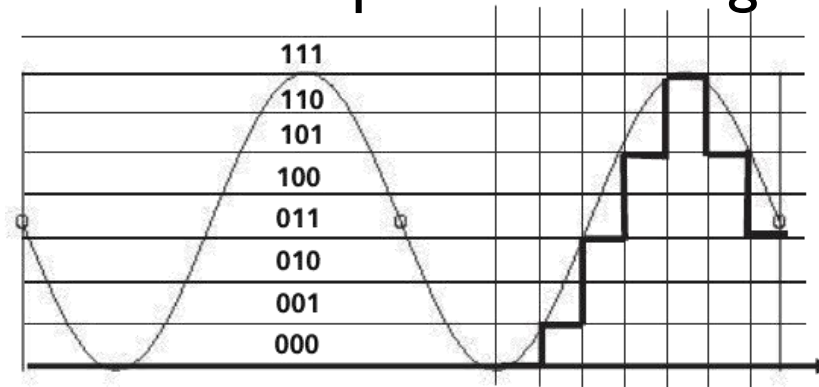


Figure 4.8 A three bit DAC (create a similar image)

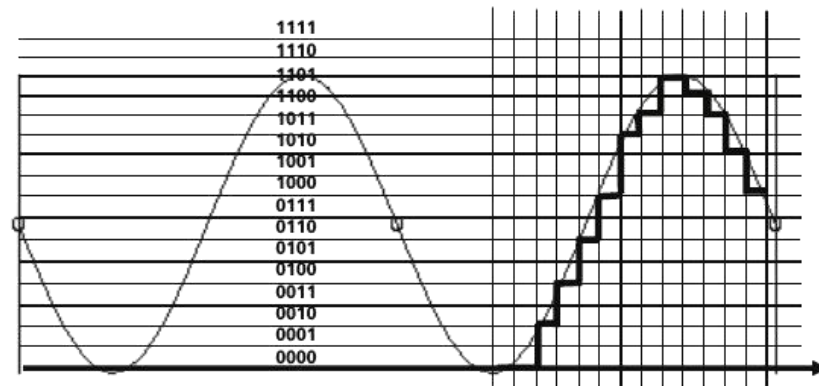


Figure 4.9 A four bit DAC (create a similar image)

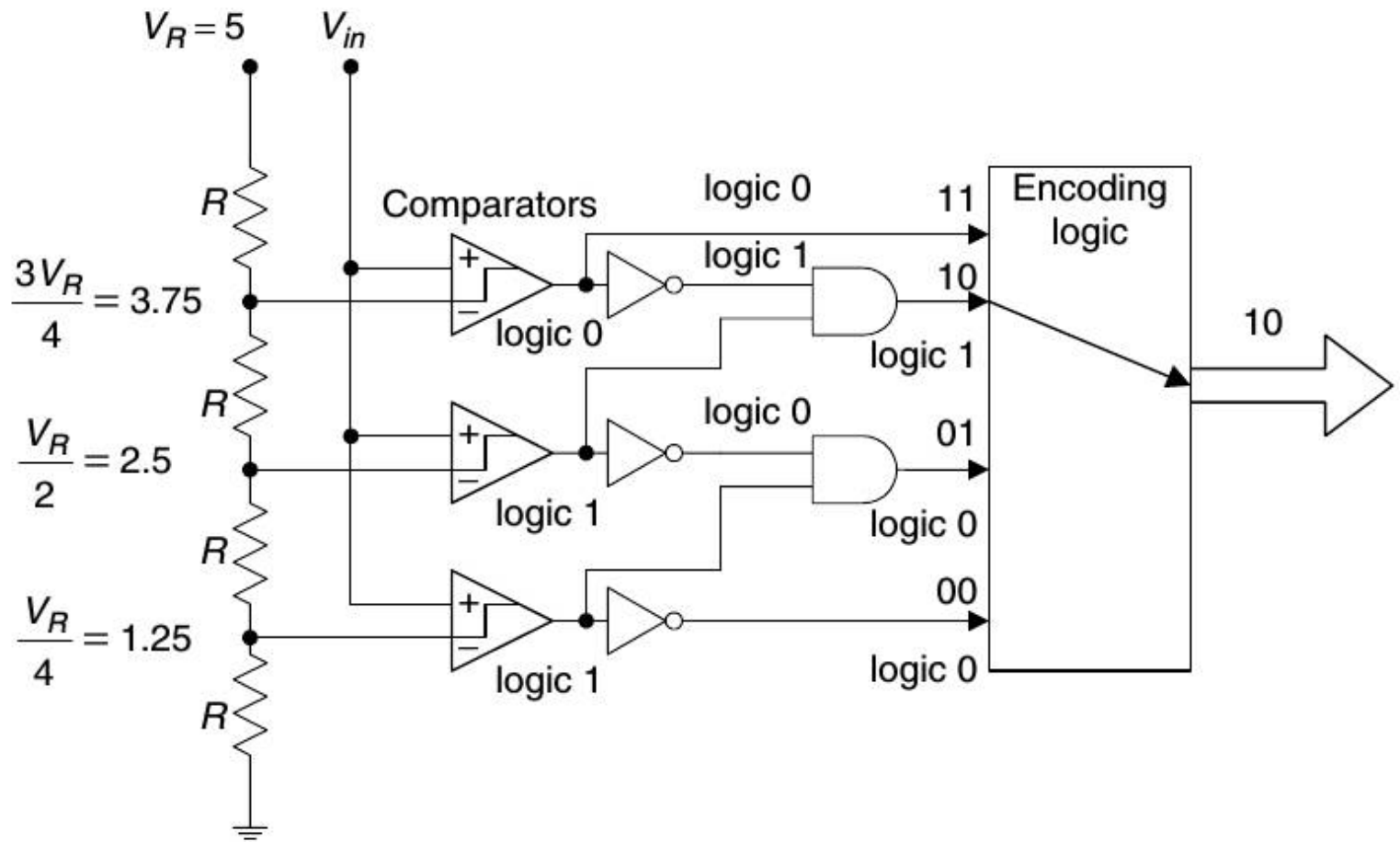
Problem

- Which is the resolution for each step for a 10 bit converter.
- For 5V how much voltage corresponds to a step
- For a 12 bit ADC how much voltage corresponds to a step

Some types of ADC

- Flash converters
- Successive approximation
- Sigma-delta ADC.

2-bit flash ADC



Sample and hold

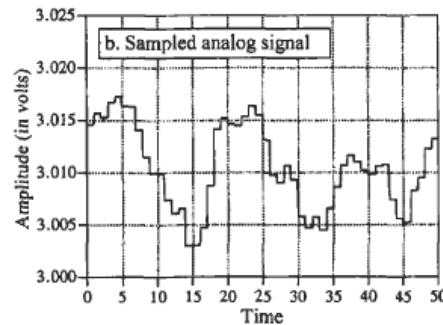
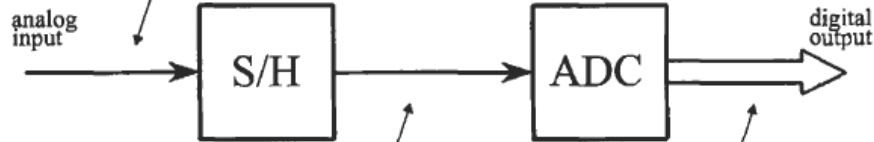
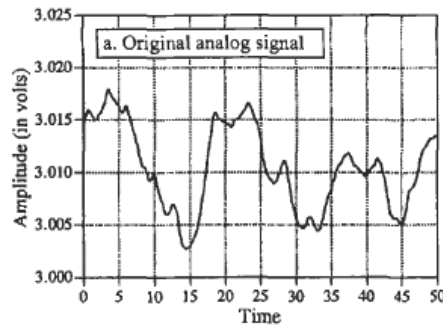


FIGURE 3-1 Waveforms illustrating the digitization process. The conversion is broken into two stages to allow the effects of *sampling* to be separated from the effects of *quantization*. The first stage is the sample-and-hold (S/H), where the only information retained is the instantaneous value of the signal when the periodic sampling takes place. In the second stage, the ADC converts the voltage to the nearest integer number. This results in each sample in the digitized signal having an error of up to $\pm\frac{1}{2}$ LSB, as shown in (d). As a result, quantization can usually be modeled as simply adding noise to the signal.

