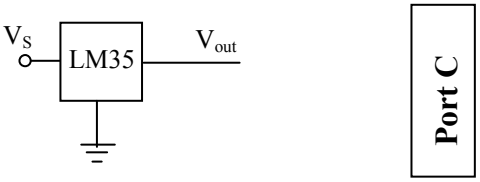
ADC and Input Range Example

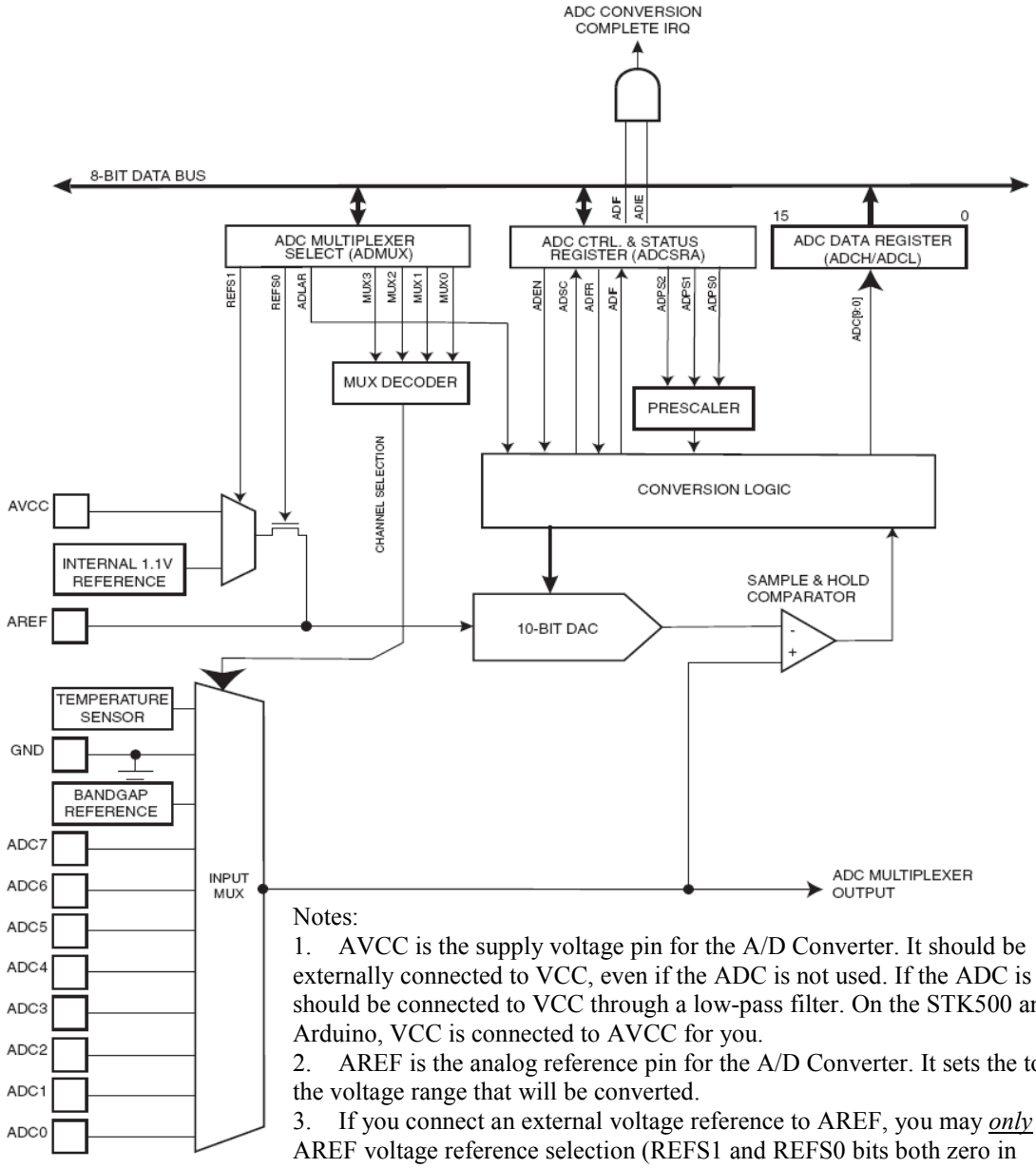
Given: LM 35 Temperature sensor
- 10 mV/°C
- 0-100°C desired measurement range

a). What is the smallest temperature change you could resolve if the output from the LM 35 is connected directly to one of the Port C pins on the ATmega328? (What is the LSB?)



b). What would you do to maximize the resolution of temperature measurement in this situation? What is the best resolution you could obtain with the ATmega328 in this measurement example?

Figure 23-1. Analog to Digital Converter Block Schematic Operation,

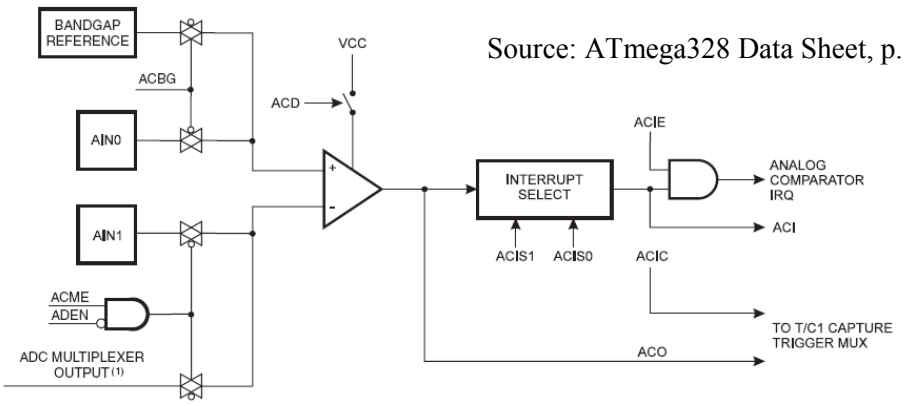


Notes:

1. AVCC is the supply voltage pin for the A/D Converter. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter. On the STK500 and the Arduino, VCC is connected to AVCC for you.
2. AREF is the analog reference pin for the A/D Converter. It sets the top of the voltage range that will be converted.
3. If you connect an external voltage reference to AREF, you may *only* use the AREF voltage reference selection (REFS1 and REFS0 bits both zero in ADMUX register), so that you don't short to AVCC.

Source: ATmega328 Data Sheet, p. 252

Figure 22-1. Analog Comparator Block Diagram[(2)]



Source: ATmega328 Data Sheet, p. 247