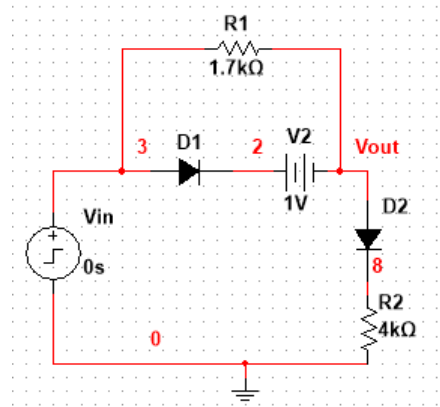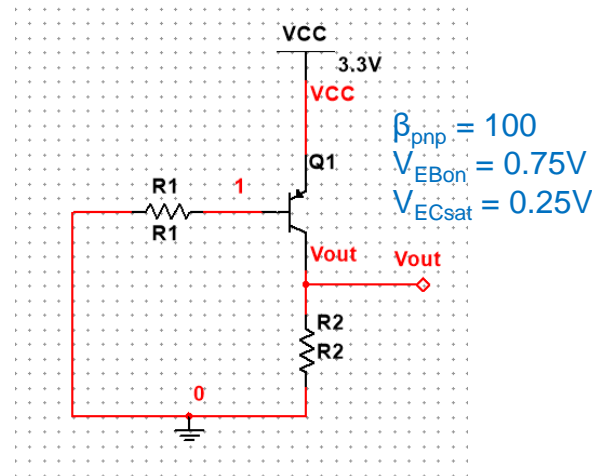1 – Sketch out the transfer characteristic of this circuit Vout vs Vin for Vin ranging from 0V to 5V. Assume $V_{Don} = 0.7V$. Be sure to identify notable voltages and slopes.                                                                          20pts

2 – Select values for R1 and R2 in the circuit below. The output voltage should be 1.6V with a < 10% error to loads greater than 15KΩ 20pts

VCC

3.3V

VCC

$\beta_{pnp} = 100$

$V_{EBon} = 0.75V$

$V_{ECsat} = 0.25V$

Q1

R1 1

R1

Vout Vout

R2

R2

0

3 – Design a first order active low pass filter with a cutoff frequency of 30KHz and Zin > 20KΩ, use industry standard common components (listed on the website)                                                    30pts

4 – Provide the LSB size for each of the following:                              30pts

    10bit ADC with Vref = 2.5V        _____

    12bit DAC with Vdd = 3.3V         _____

Provide the expected output value (hex) for the 10bit ADC above with Vin = 1.8V

Provide the expected output value (V) for the 12bit DAC above with the input set to 0x7A3

Briefly describe what Quantization Error is: