

## ASSIGNMENT 08: MUST BE EASY

1. We know that we can model the collector current,  $I_C$ , of a BJT as:

$$I_C = I_S e^{\frac{V_{BE}}{V_T}} \quad (1)$$

where

$$I_S = \frac{A_E q D_n n_i^2}{N_B W_B}. \quad (2)$$

Solve for the cross section area,  $A_E$ , in terms of  $I_C$ .

2. We know that we can model the voltage of an  $RC$  circuit with the following differential equation:

$$V_S(t) = RC \frac{dV_C(t)}{dt} + V_C(t). \quad (3)$$

Use `dsolve()` to solve this differential equation.

3. Evaluate  $\mu_0 = 4\pi \times 10^{-7}$  to  $\lfloor 1000\pi \rfloor$  decimal places.

**Hint:** Convert  $4 \times 10^{-7}$  to a symbolic value with `sym()`.