10.18 $\frac{I_{C1}}{I_{C2}} = 5$. $T = 27°C \therefore V_T = \frac{kT}{q} = 25.7$ mV.

Use the results from the large signal analysis in the notes: $I_{C1} = \frac{I_{EE} \exp\left(\frac{V_{in1} - V_{in2}}{V_T}\right)}{1 + \exp\left(\frac{V_{in1} - V_{in2}}{V_T}\right)}$

$$I_{C2} = \frac{I_{EE}}{1 + \exp\left(\frac{V_{in1} - V_{in2}}{V_T}\right)}.$$

$$\therefore \frac{I_{C1}}{I_{C2}} = \exp\left(\frac{V_{in1} - V_{in2}}{V_T}\right).$$

$$V_{in1} - V_{in2} = V_T \ln \frac{I_{C1}}{I_{C2}} = 0.0257 \ln 5 = 41.6 \text{ mV}.$$

Now apply this difference at 100°C.

$$V_T = \frac{kT}{q} = 32.2 \text{ mV}.$$

$$\frac{I_{C1}}{I_{C2}} = \exp\left(\frac{41.6 \times 10^{-3}}{32.2 \times 10^{-3}}\right) = 3.64.$$

The current ratio changed from 5 to 3.64.