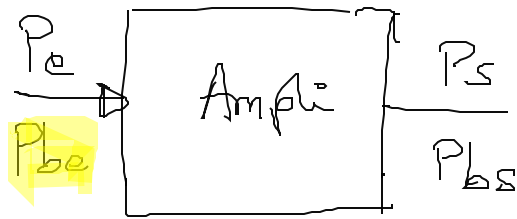
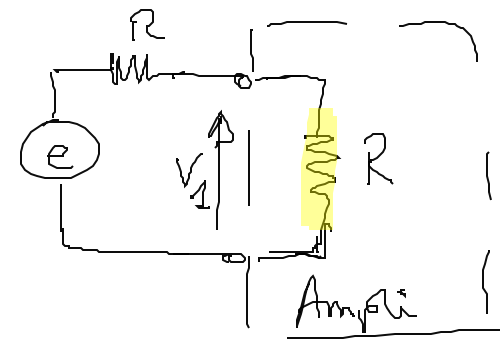


3.1.

$$P_{be} = \frac{V_{n\text{eff}}^2}{R}$$



$$V_1 = \frac{e R}{R+R} = \frac{e}{2} \Rightarrow P_{be} = \left(\frac{e}{2}\right)^2 \cdot \frac{1}{R} = \frac{e^2}{4R}$$

$$\text{et } e^2 = 4kTRB \Rightarrow \boxed{P_{be} = kTB}$$