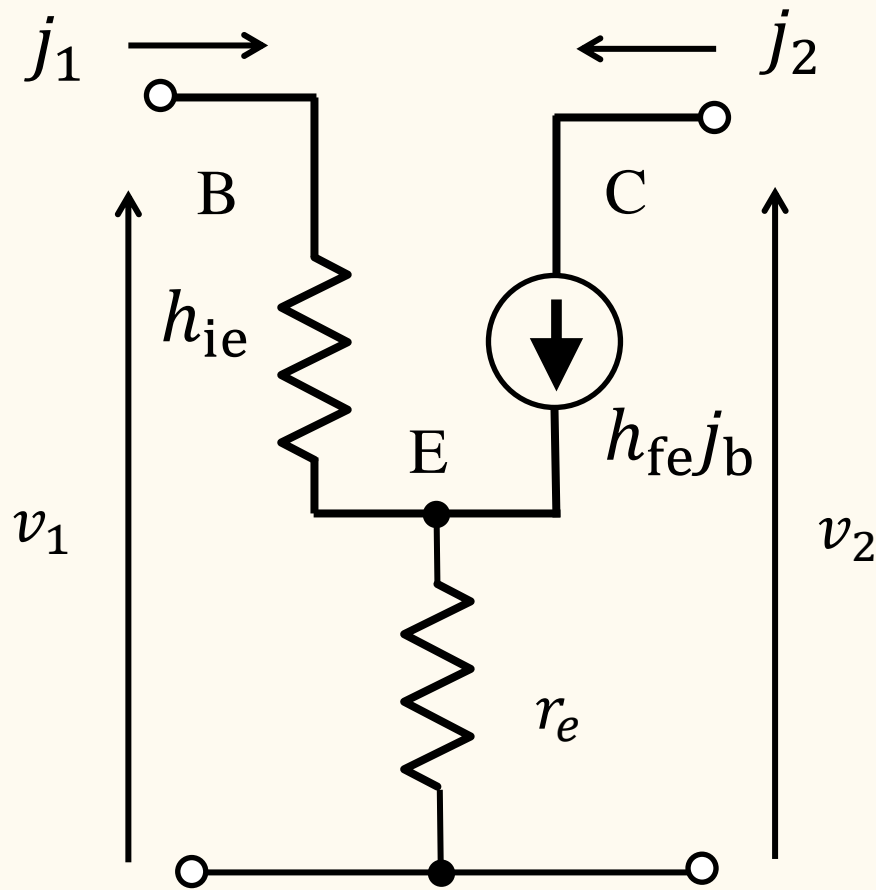


# Exercise 4-1



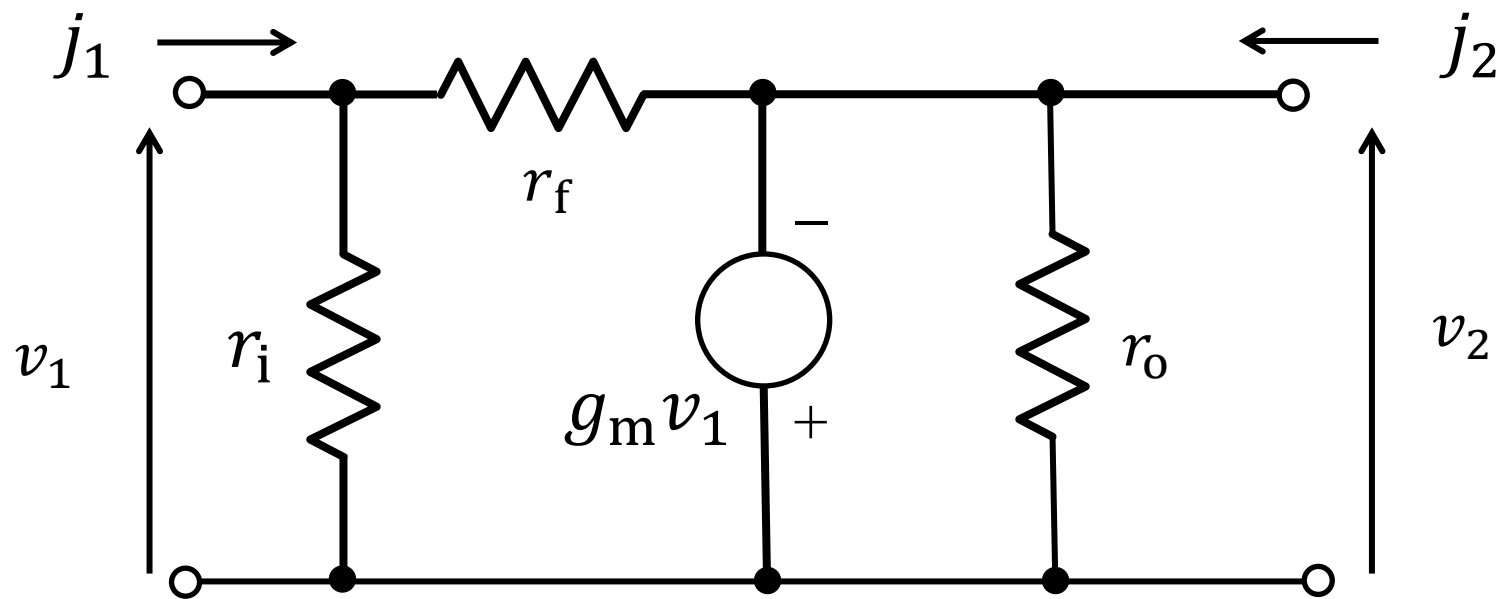
Let us view a bipolar transistor plus an emitter resistance as a four terminal circuit as shown in the left figure.

Obtain the Y (admittance) matrix defined below for this circuit.

Calculate each element in the Y matrix for  $r_e = 25\Omega$ ,  $h_{ie} = 500\Omega$ ,  $h_{fe} = 200$

$$\begin{pmatrix} j_1 \\ j_2 \end{pmatrix} = \begin{pmatrix} Y_{11} & Y_{12} \\ Y_{21} & Y_{22} \end{pmatrix} \begin{pmatrix} v_1 \\ v_2 \end{pmatrix}$$

# Exercise 4-2



Obtain the Y matrix for the above equivalent circuit ( $\pi$ -shape circuit).

## Exercise 4-3

$l=1\text{km}$  の伝送線路がある。終端側を短絡したところ、電源側から測定したインピダンスは  $0.6i \Omega$  であった。一方、終端側を開放して電源側からアドミタンスを測定すると  $4 \times 10^{-6}i \text{ S}$  であった。  
この伝送線路の特性インピダンスを求めよ。

Consider a transmission line with the length  $l = 1\text{km}$ . First we short-circuited the end and measured the impedance from the signal source and obtained  $0.6i \Omega$ . Next we opened the end and measured the admittance from the signal source and obtained  $4 \times 10^{-6}i \text{ S}$ .

What is the characteristic impedance of the transmission line?