電験どうでしょう管理人

*KWG presents*

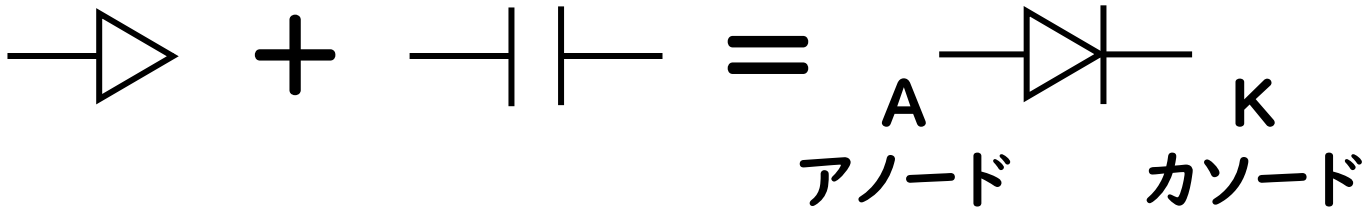
# 電験オンライン塾

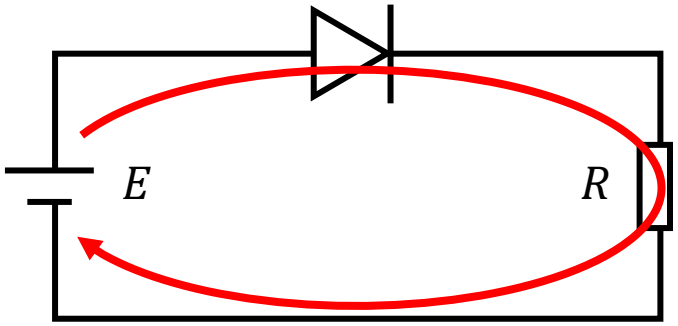
# 第一回　ダイオード（１）

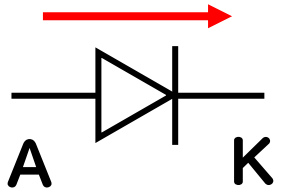
2021.02.20 Sat

# ダイオードとは

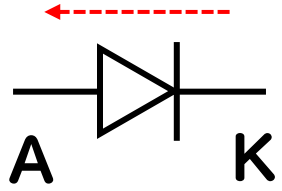
- 半導体で作られた電気素子
- 整流作用（電流が一方向だけ流れる）



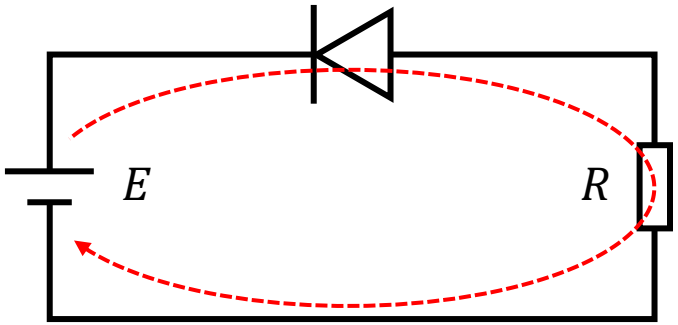




アノードからカソード：電流が流れる



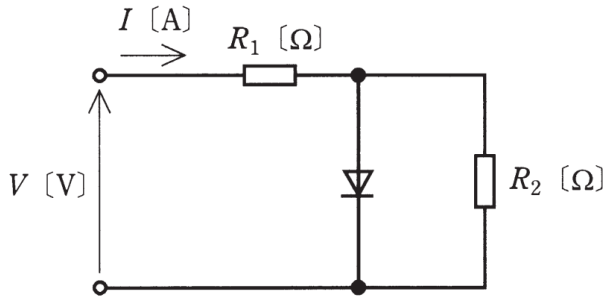

カソードからアノード：電流が流れない



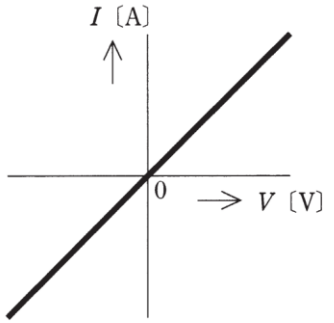
# 過去問（H24 問13）

問13　図は，抵抗 $R_1$〔Ω〕とダイオードからなるクリッパ回路に負荷となる抵抗 $R_2$〔Ω〕（$=2R_1$〔Ω〕）を接続した回路である。入力直流電圧 $V$〔V〕と $R_1$〔Ω〕に流れる電流 $I$〔A〕の関係を示す図として，最も近いものを次の(1)～(5)のうちから一つ選べ。

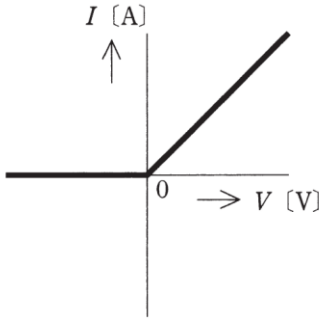
ただし，順電流が流れているときのダイオードの電圧は，0〔V〕とする。また，逆電圧が与えられているダイオードの電流は，0〔A〕とする。



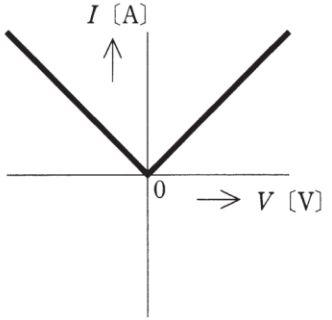

(1)



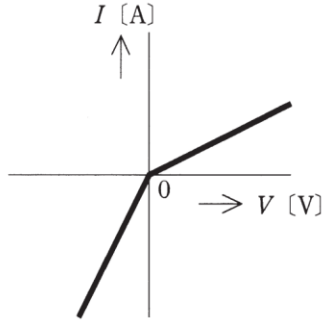

(2)



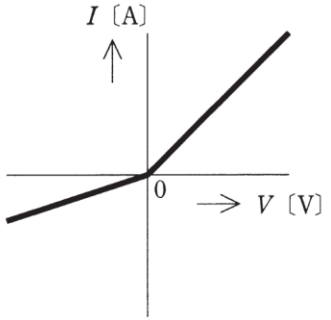

(3)




(4)

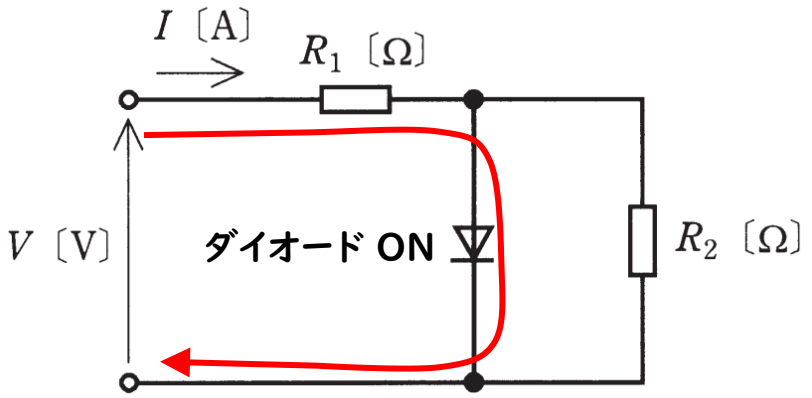



(5)

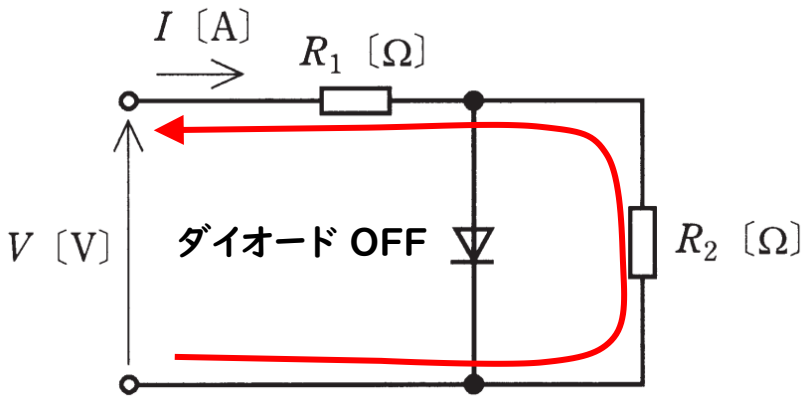


# 過去問（H24 問13）

$V > 0$




$V < 0$

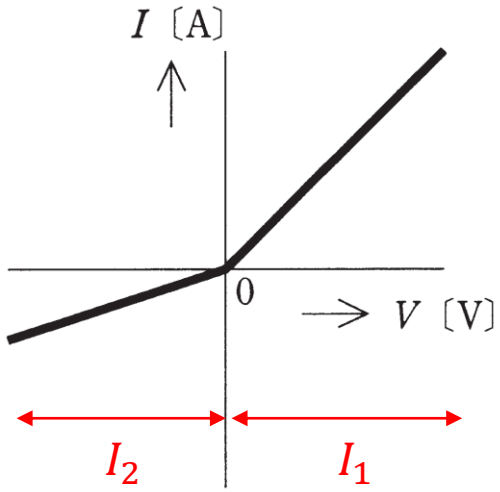



$$I_1 = \frac{V}{R_1}$$

$$I_2 = -\frac{V}{R_1 + R_2}$$

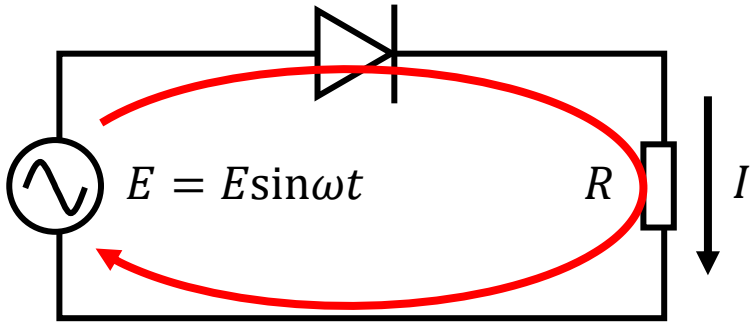
$$|I_1| > |I_2|$$

(5)

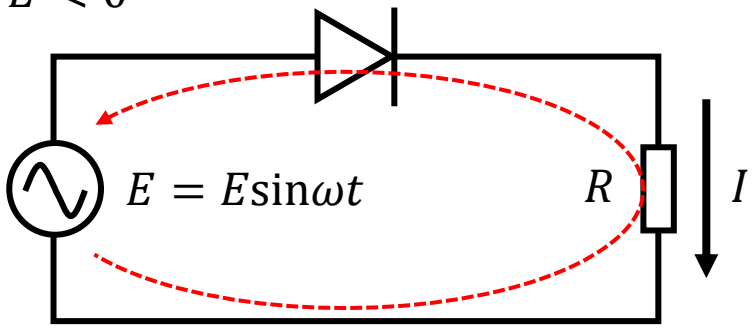


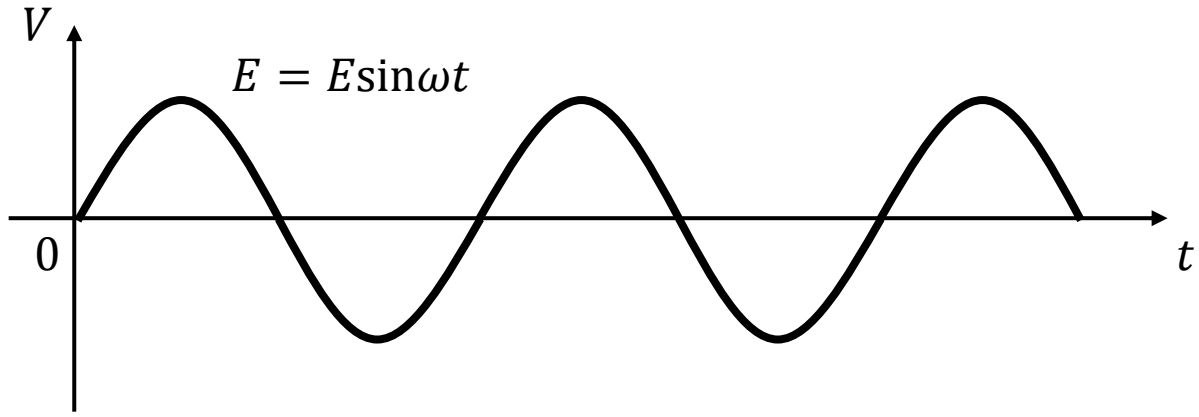
# 交流回路とダイオード

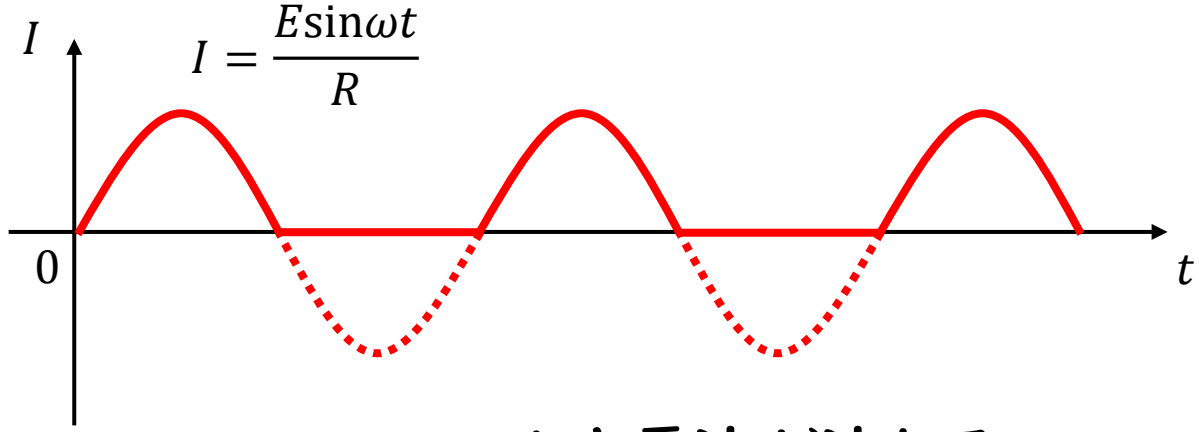
$E > 0$




$E < 0$

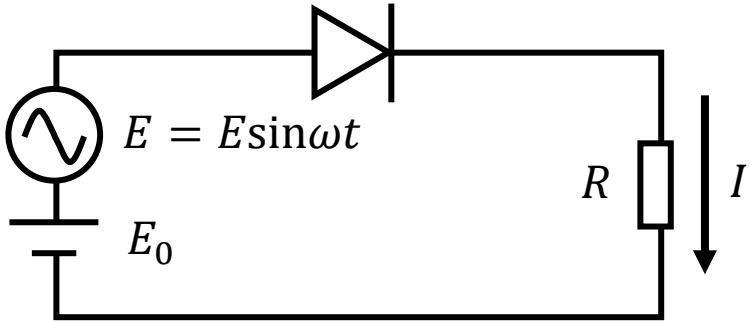


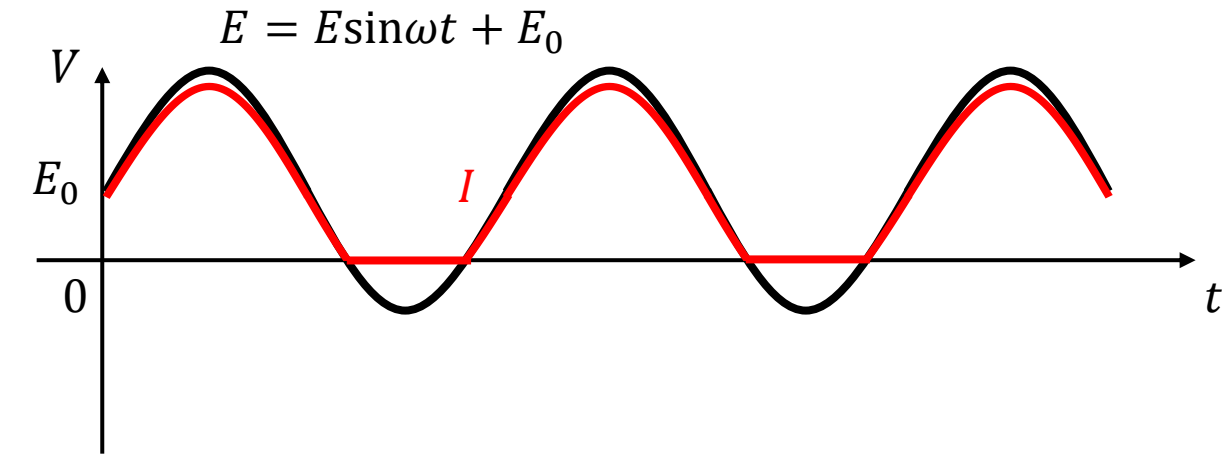



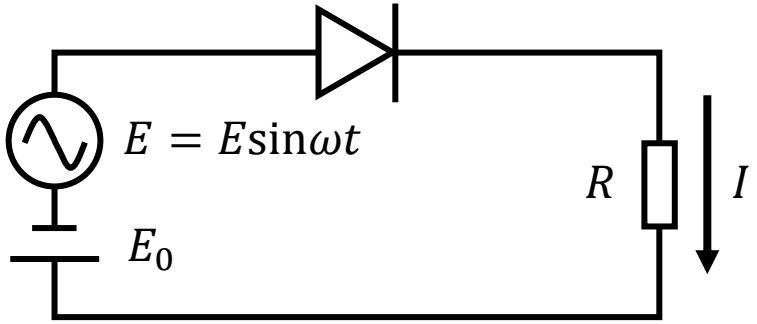



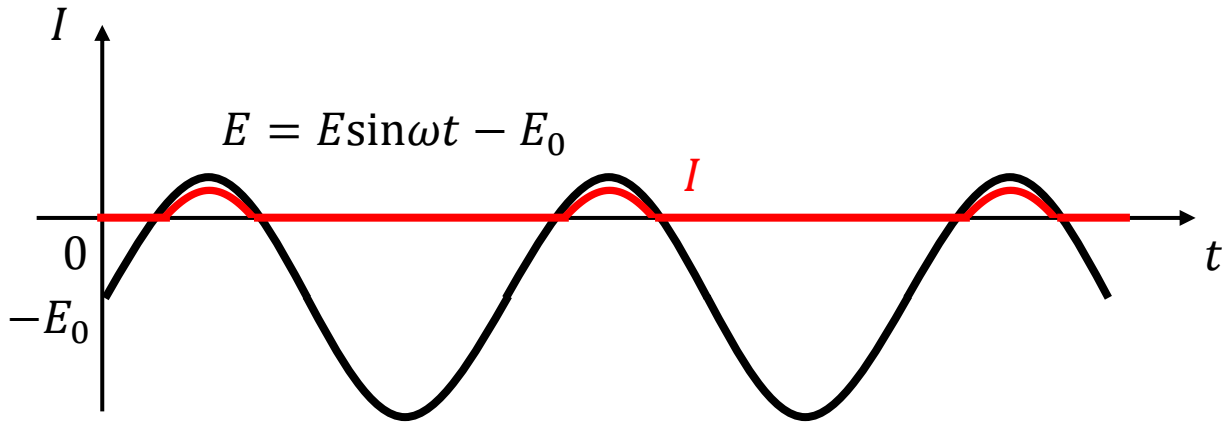

**$E > 0$のとき電流が流れる**

# 交流回路とダイオード



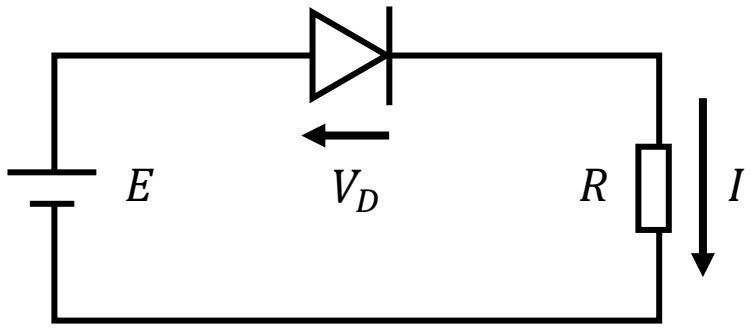



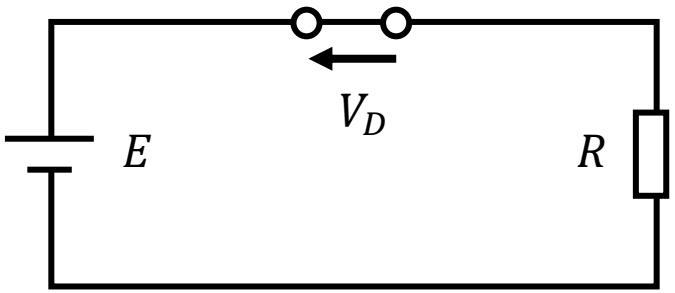

**$E > 0$のとき電流が流れる**

# ダイオードと電圧

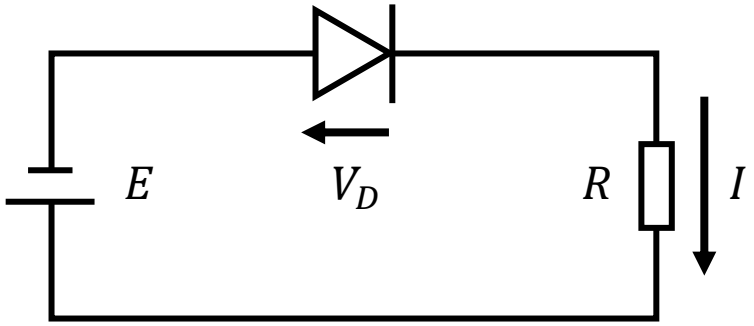



$V_D > 0$

短絡

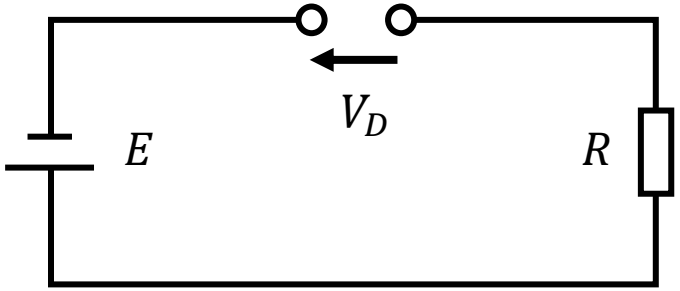



- $V_D > 0$
- ダイオードは短絡
- $V_D = 0$



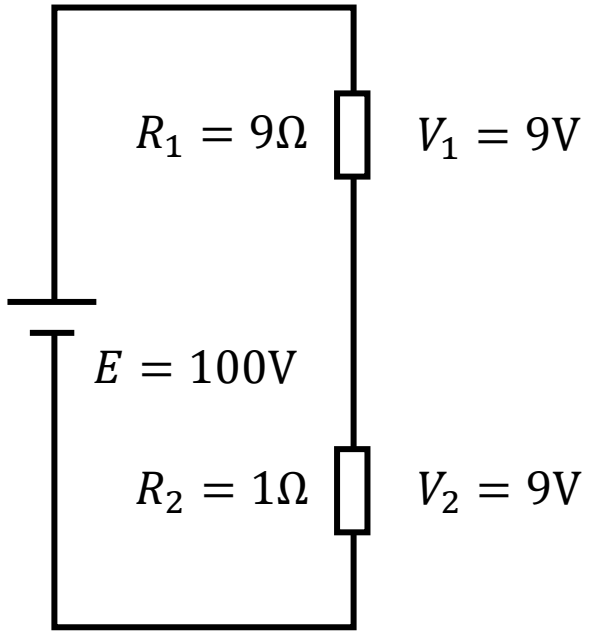

$V_D < 0$

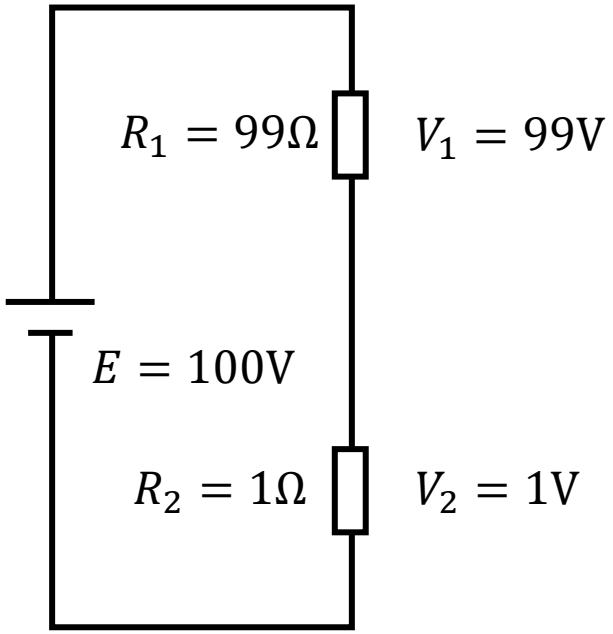
開放

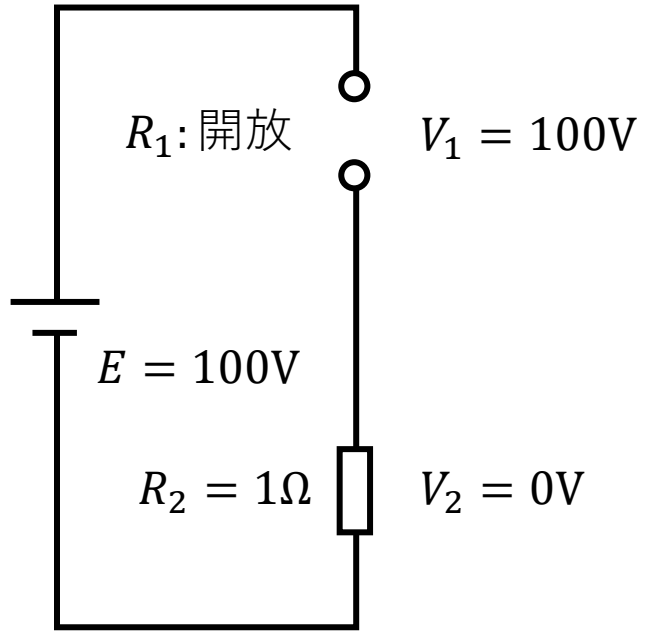



- $V_D < 0$
- ダイオードは開放
- $V_D = E$

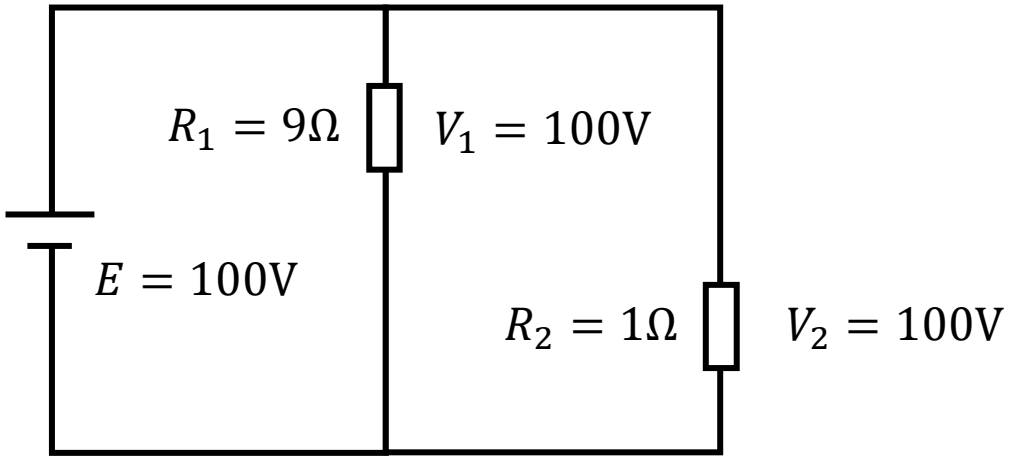
# Coffee Break 1

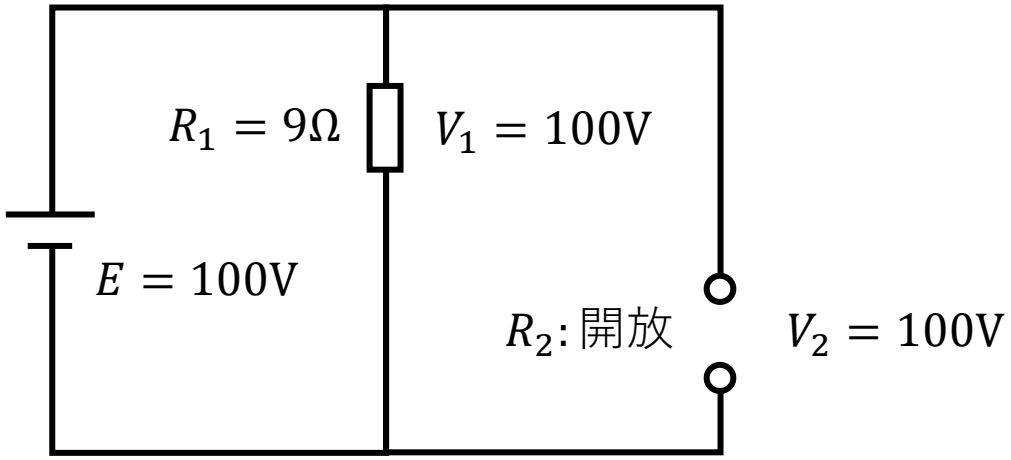


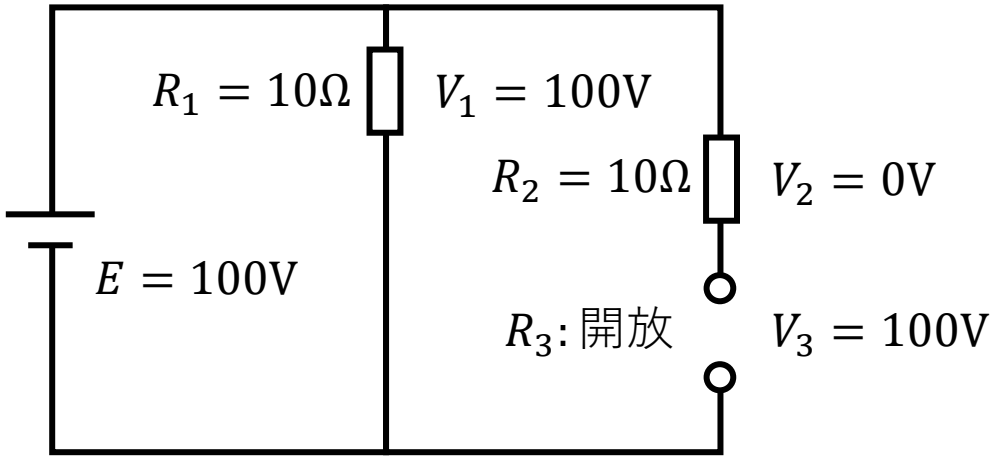



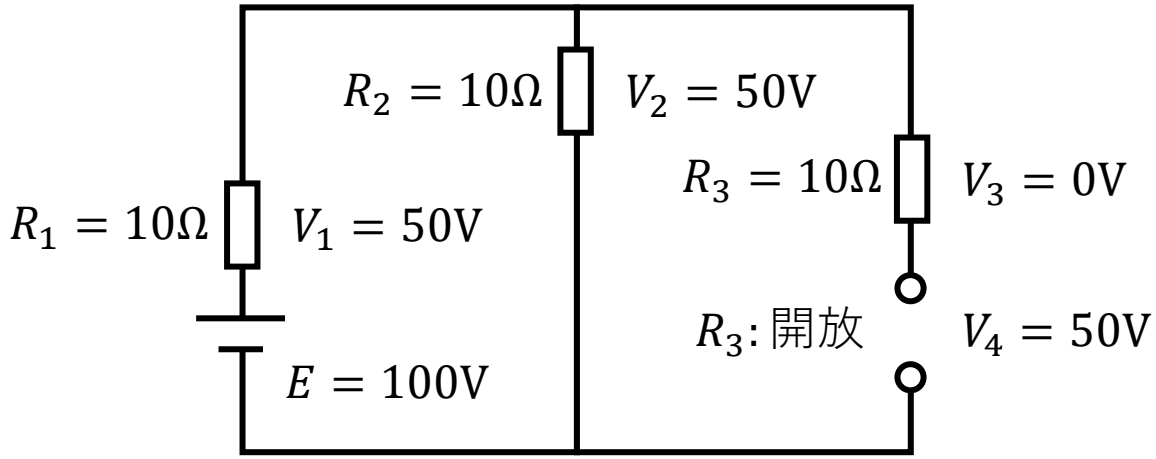



# Coffee Break 2

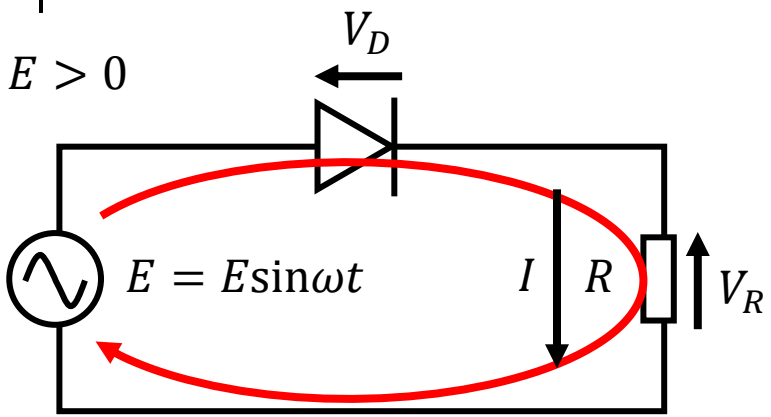


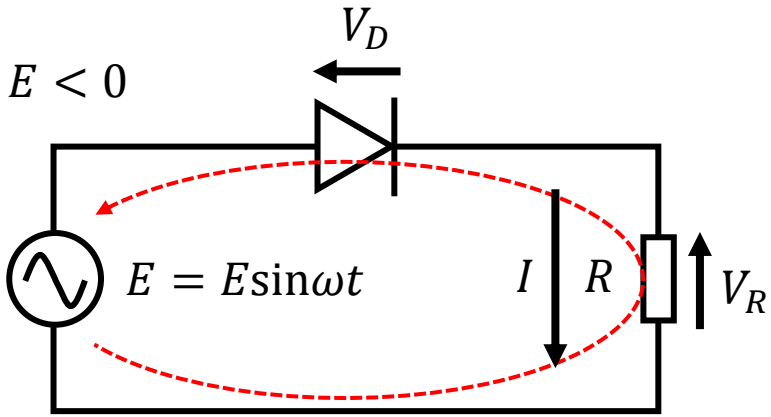



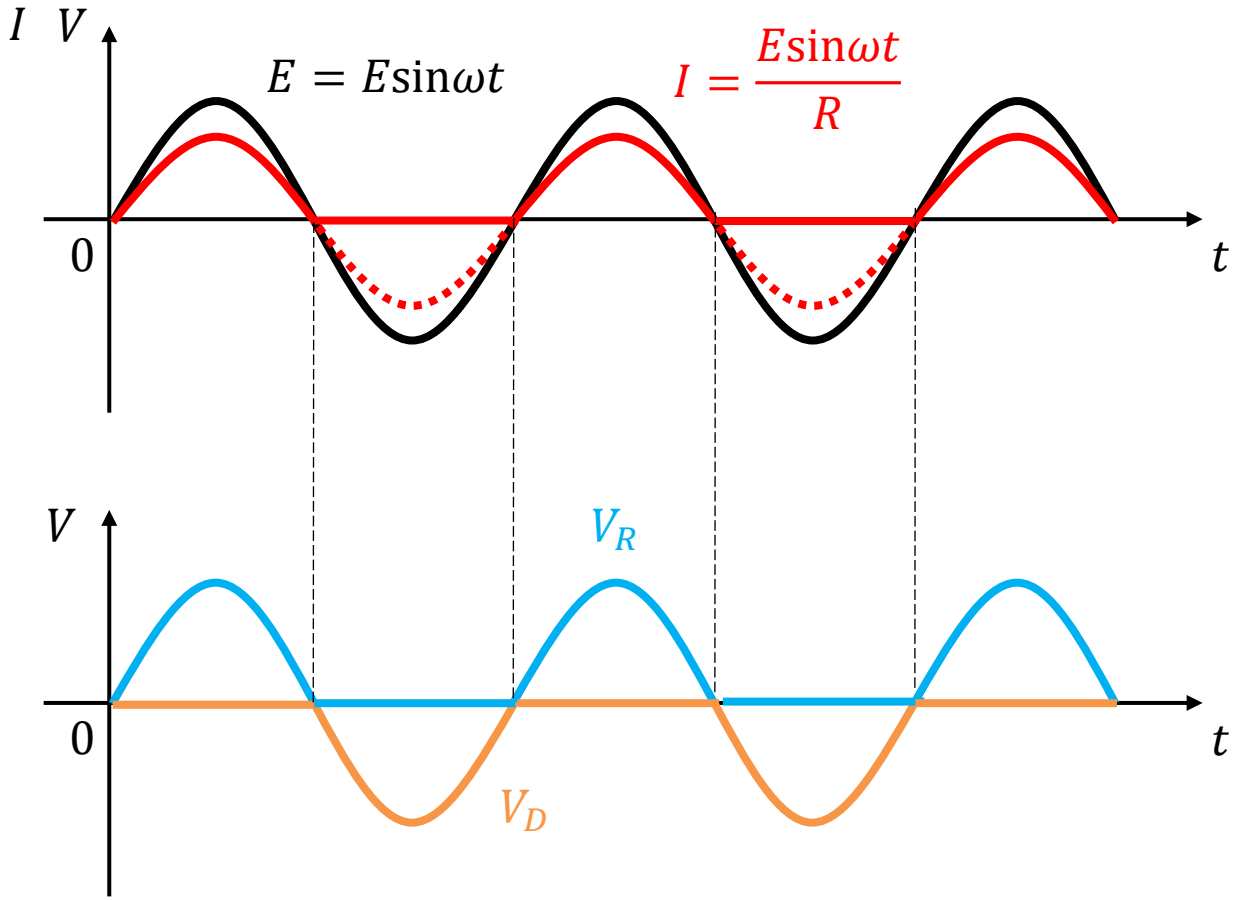



# ダイオードと電圧

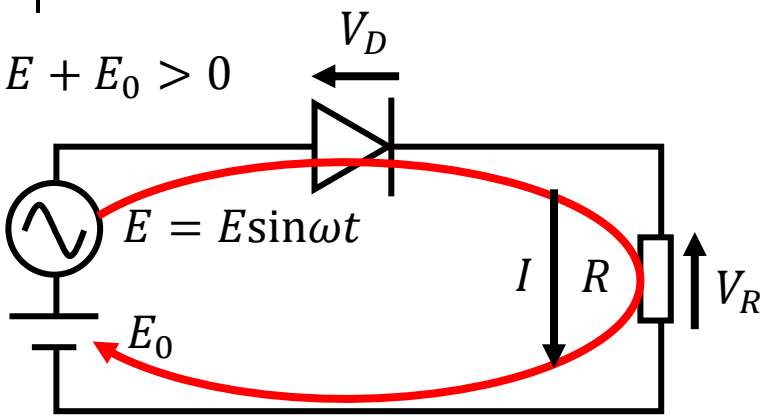


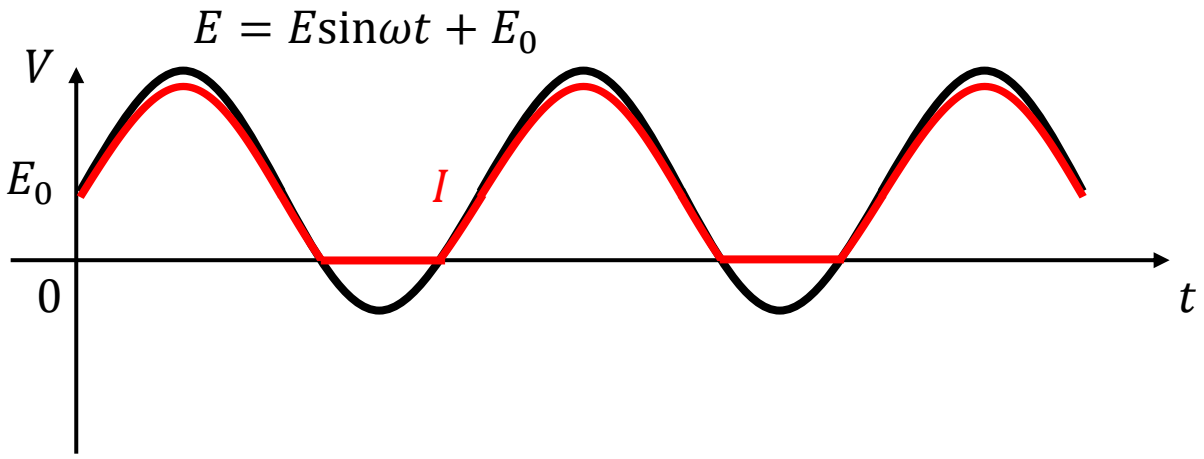



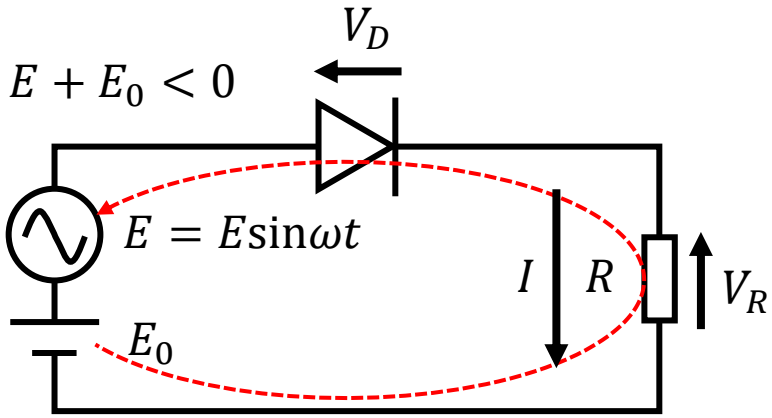



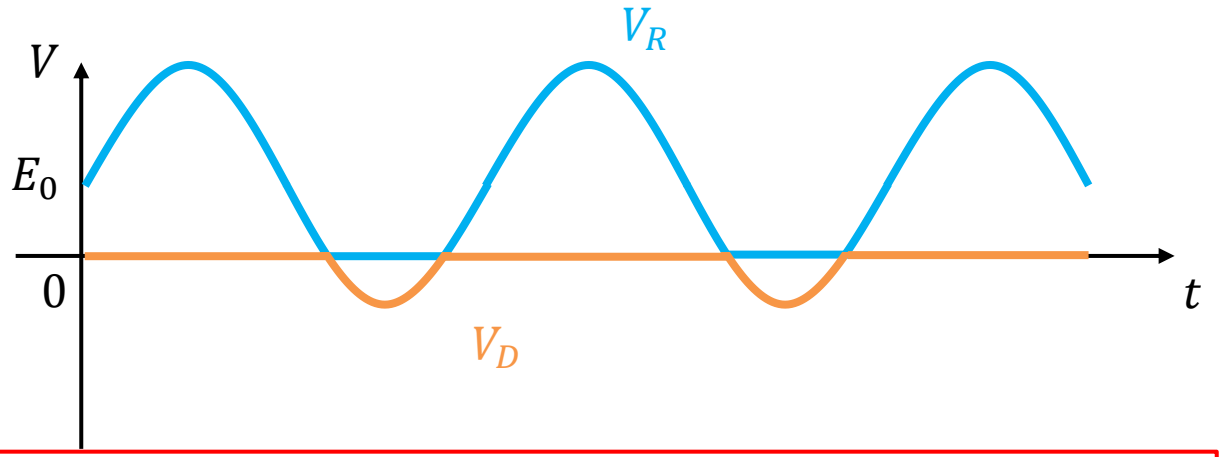

**$E > 0$ → 負荷に電圧印加 → 電流は流れる**
**$E < 0$ → ダイオードに電圧印加→ 電流は流れない**

# 交流回路とダイオード




**$E + E_0 > 0$ → 負荷に電圧印加 → 電流は流れる**
**$E + E_0 < 0$ → ダイオードに電圧印加→ 電流は流れない**

# 過去問（H30 問13）

問 13　図 1 は，ダイオード D，抵抗値 $R$[Ω]の抵抗器，及び電圧 $E$[V]の直流電源からなるクリッパ回路に，正弦波電圧 $v_i = V_m \sin \omega t$[V]（ただし，$V_m > E > 0$）を入力したときの出力電圧 $v_o$[V]の波形である。図 2(a)～(e)のうち図 1 の出力波形が得られる回路として，正しいものの組合せを次の(1)～(5)のうちから一つ選べ。

ただし，$\omega$[rad/s]は角周波数，$t$[s]は時間を表す。また，順電流が流れているときのダイオードの端子間電圧は 0 V とし，逆電圧が与えられているときのダイオードに流れる電流は 0 A とする。

(1) (a), (e)　　(2) (b), (d)　　(3) (a), (d)

(4) (b), (c)　　(5) (c), (e)

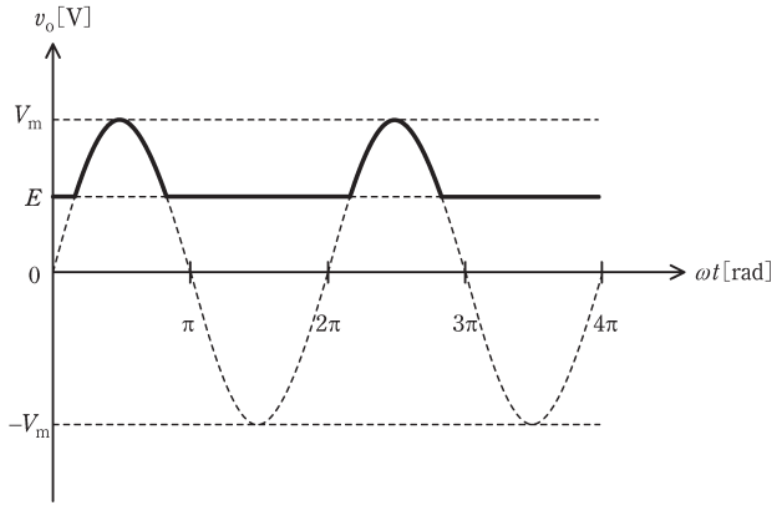



図 1

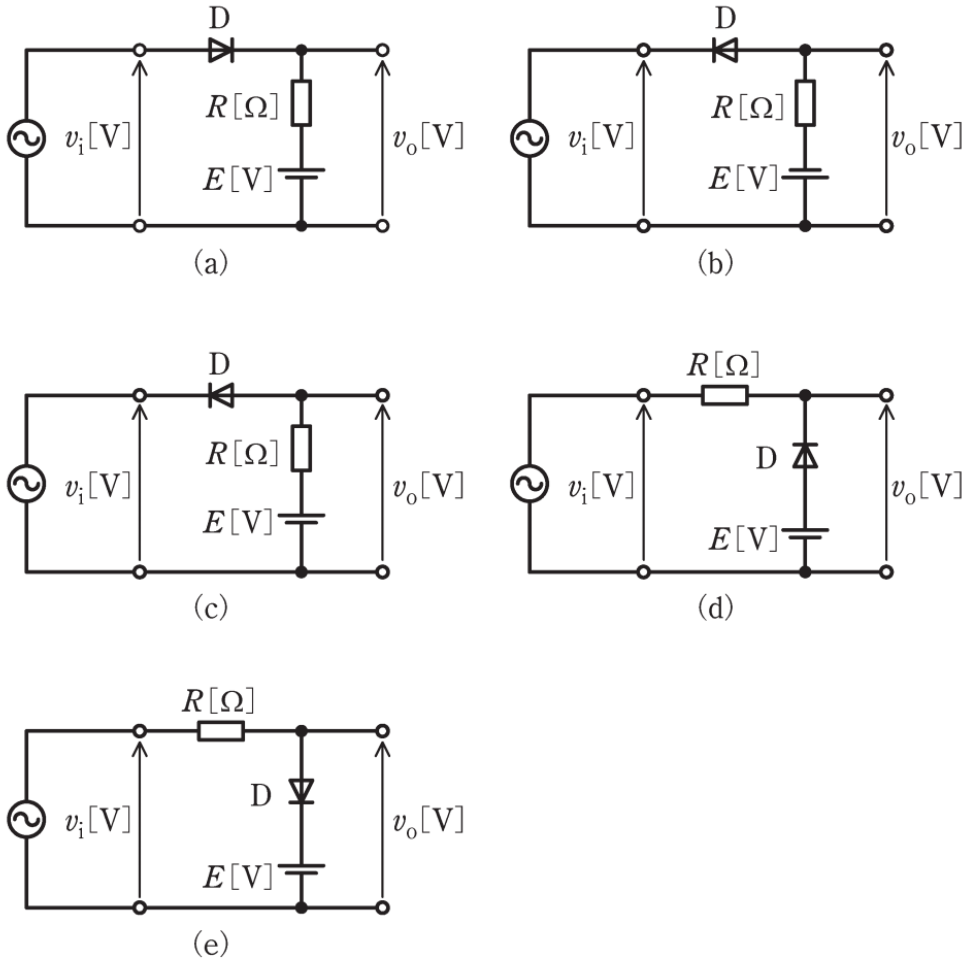
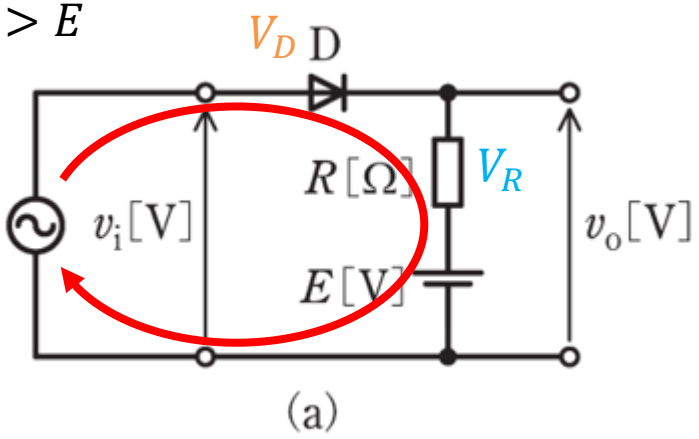


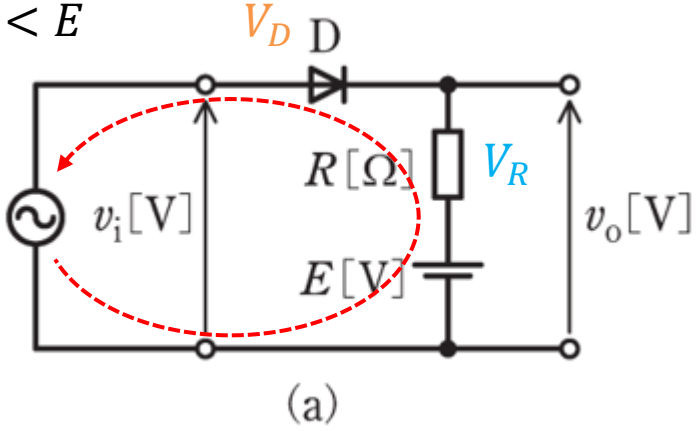

図 2

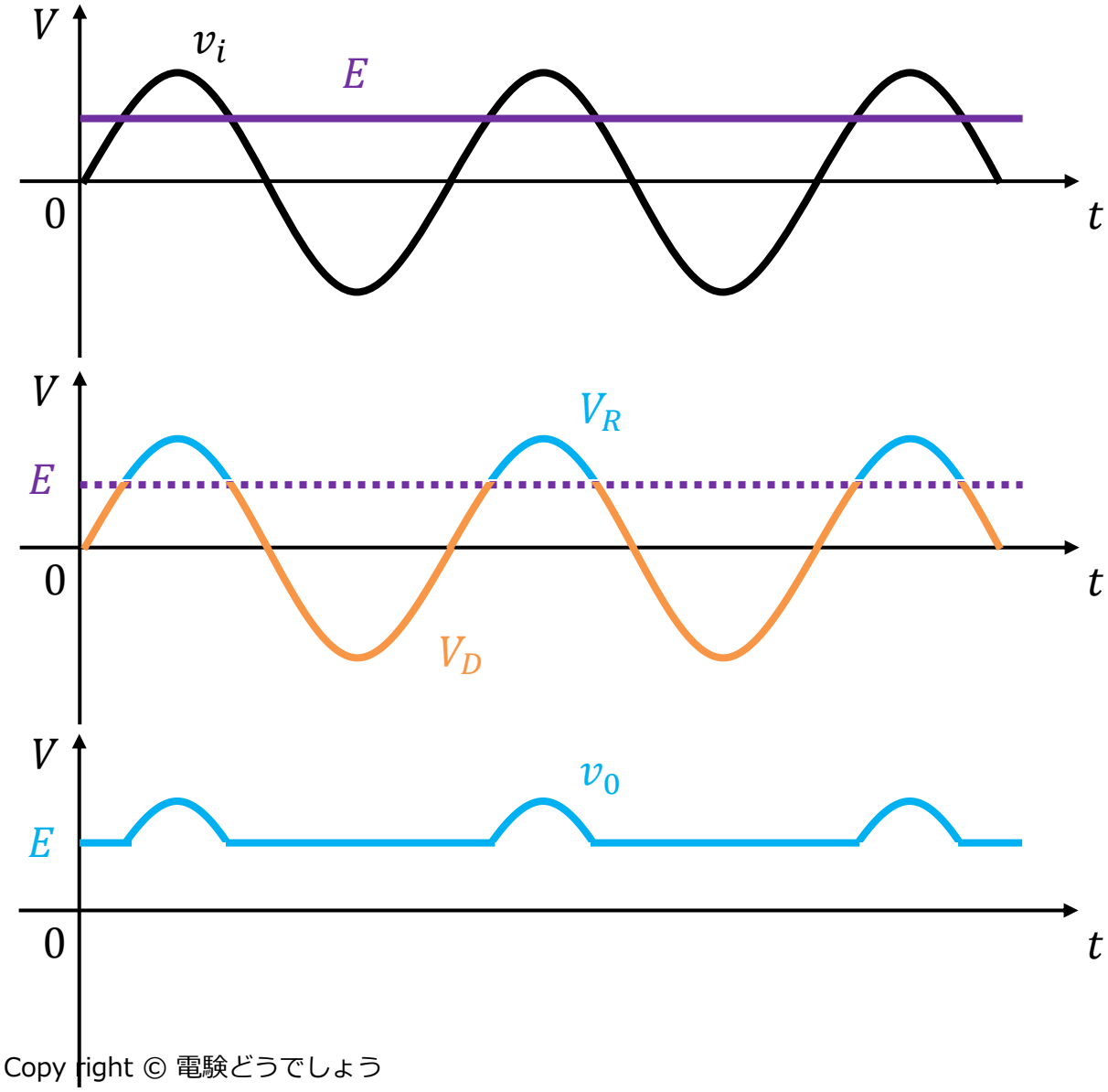
# 過去問（H30 問13）

$v_i > E$



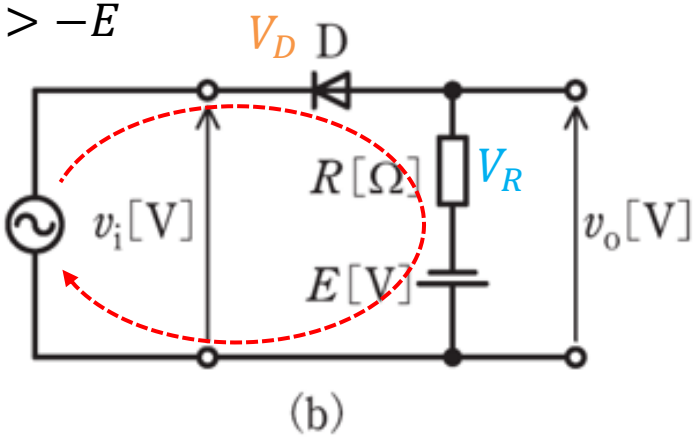

$v_i < E$



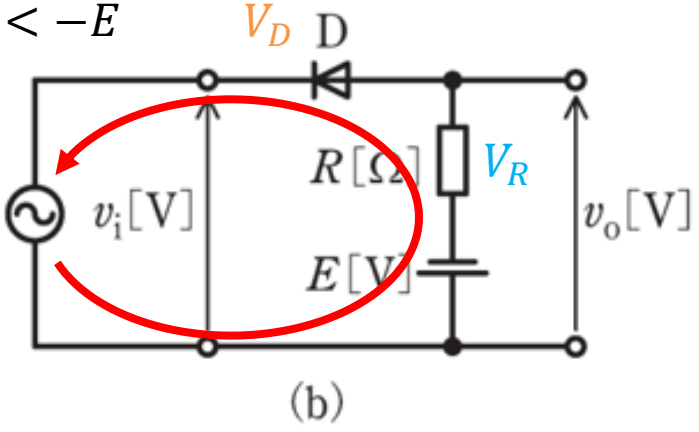
# 過去問（H30 問13）

$v_i > -E$

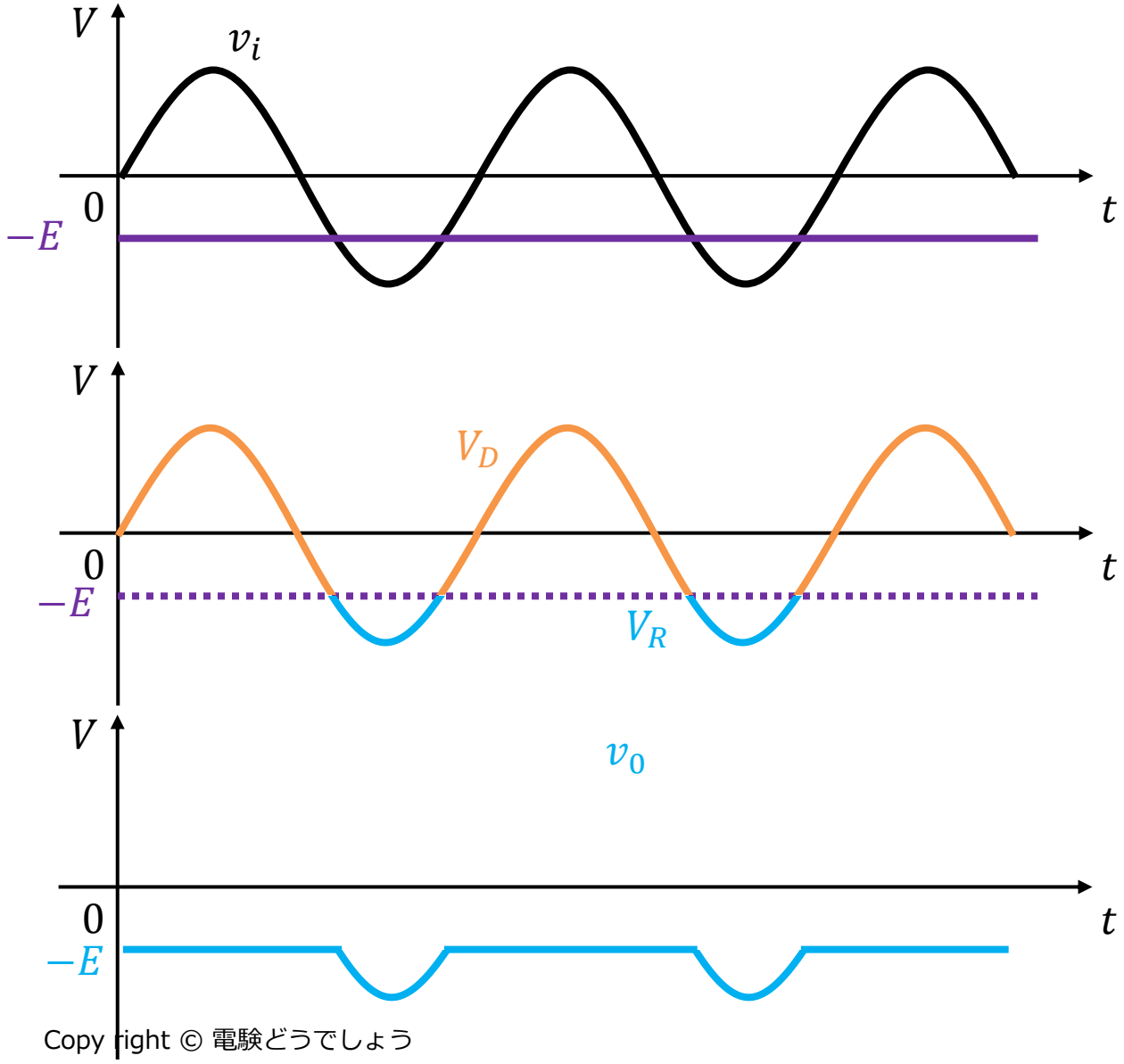



(b)

$v_i < -E$

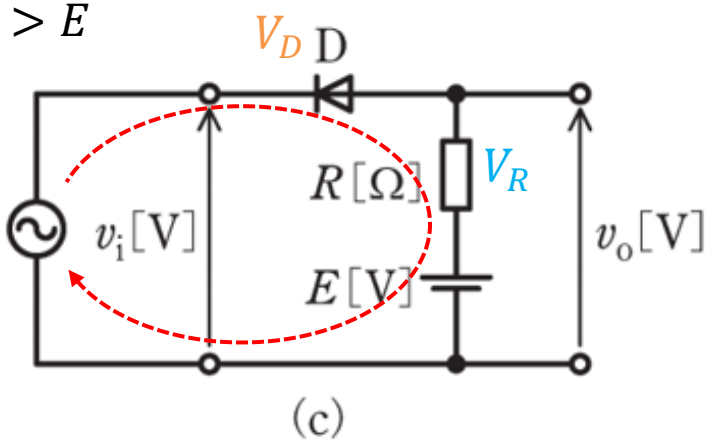



(b)



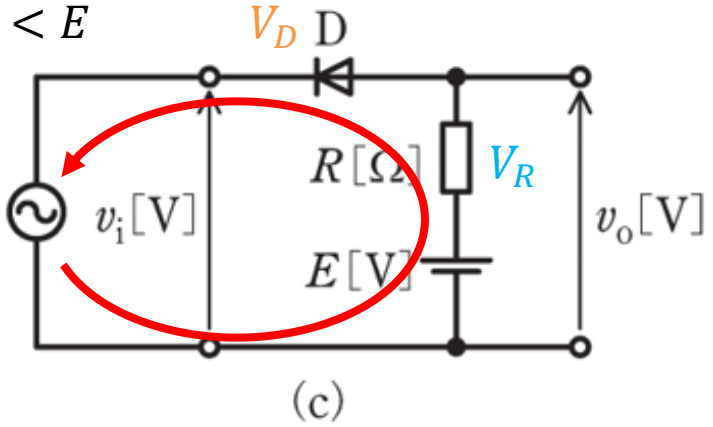
# 過去問（H30 問13）

$v_i > E$

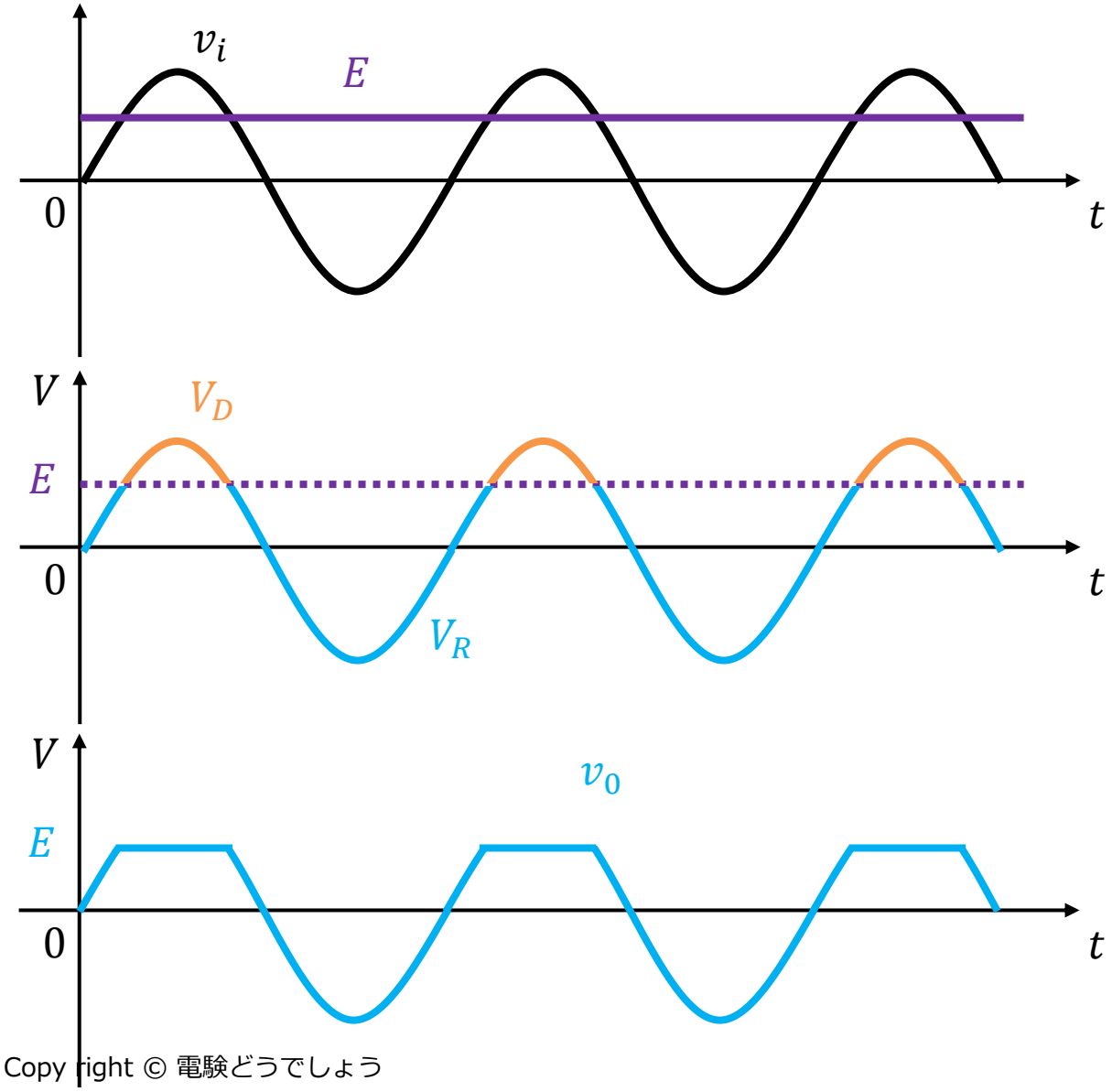



(c)

$v_i < E$

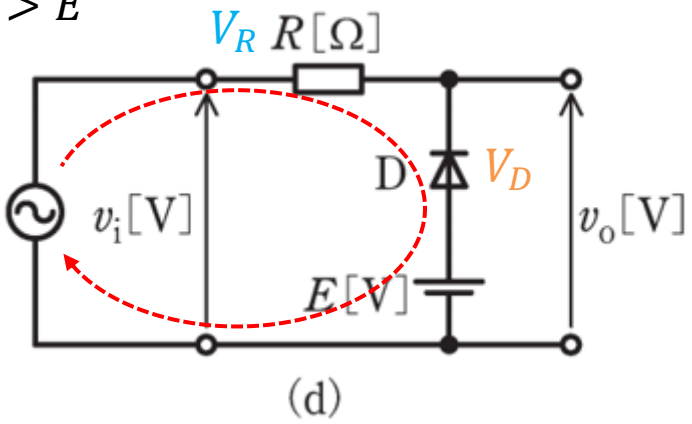



(c)



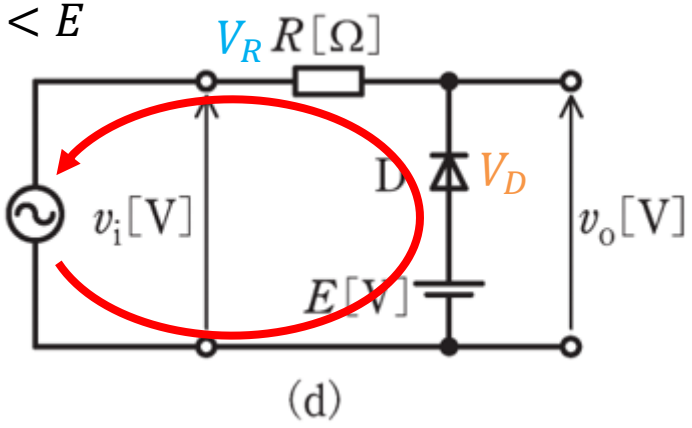
# 過去問（H30 問13）

$v_i > E$

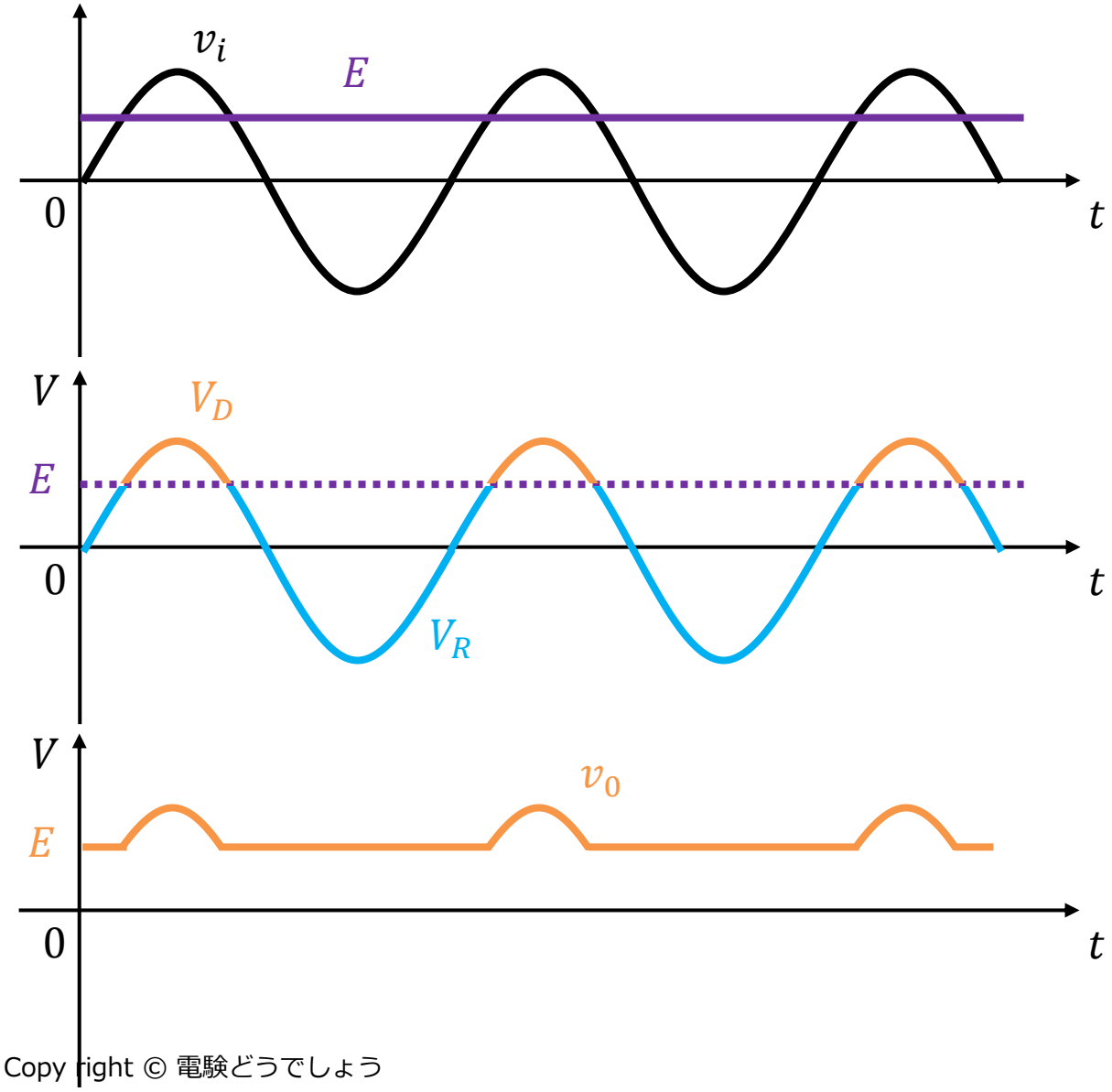



(d)

$v_i < E$

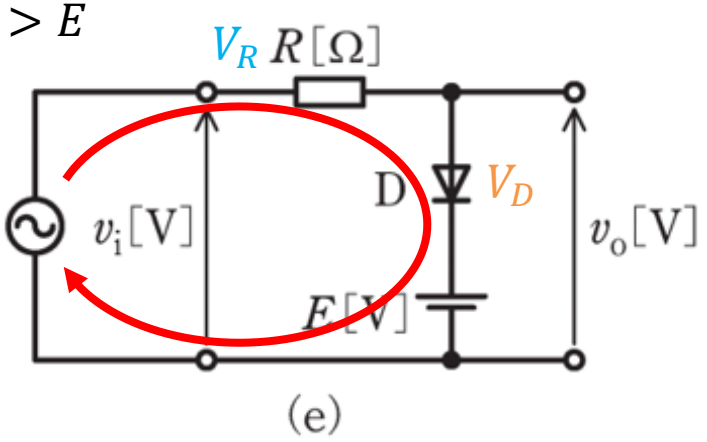



(d)



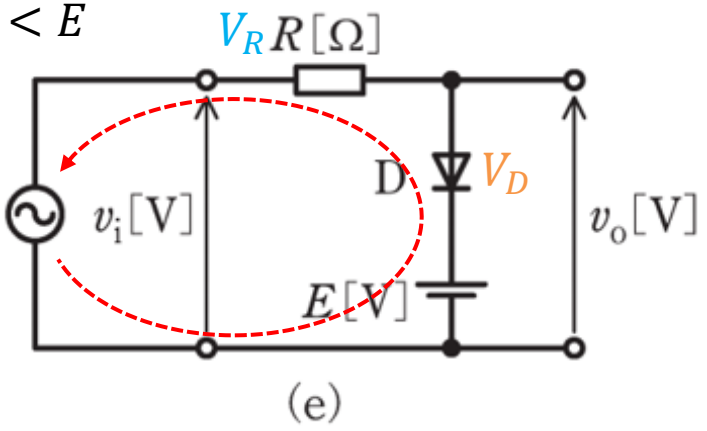
# 過去問（H30 問13）

$v_i > E$

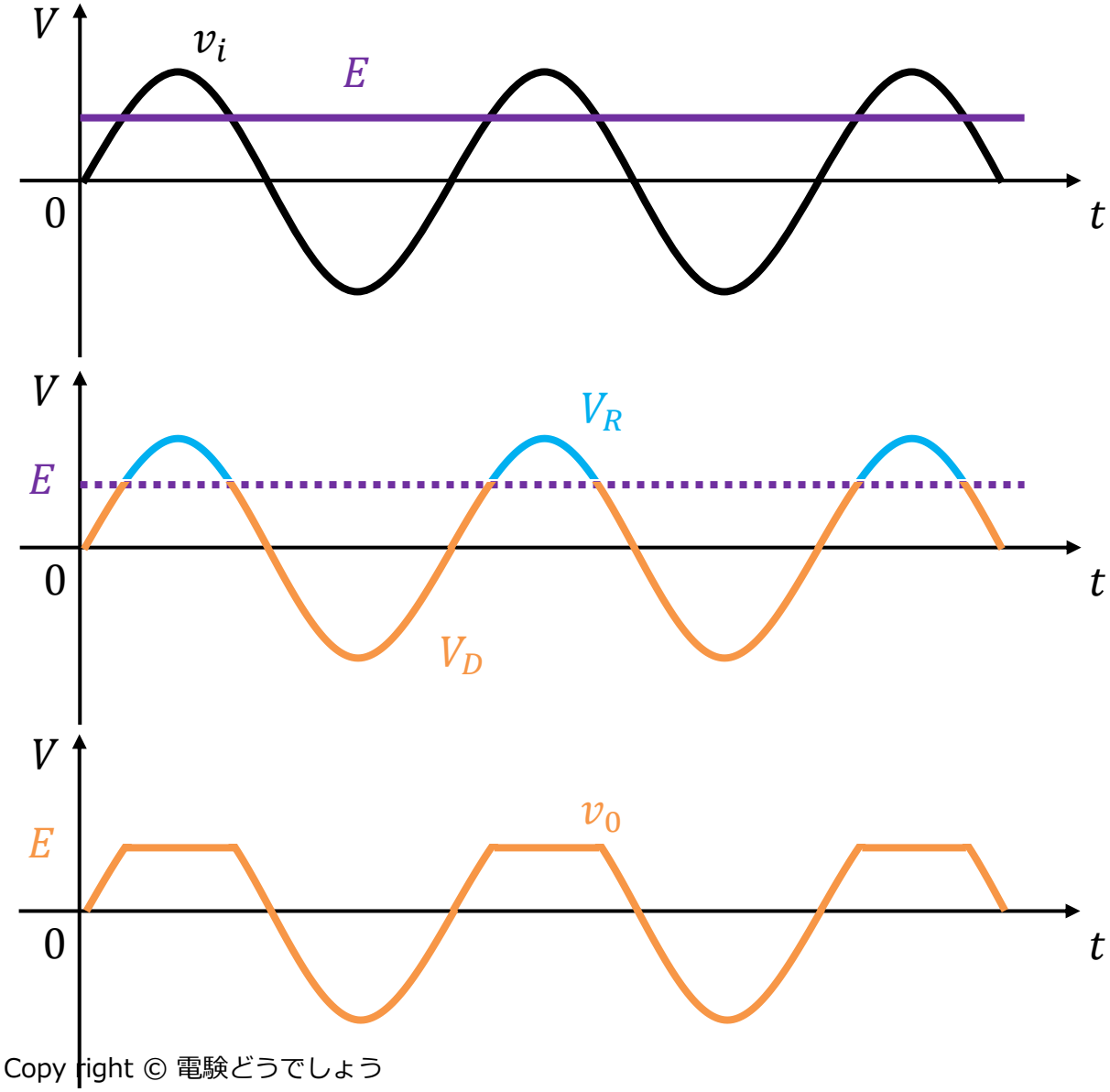



(e)

$v_i < E$




(e)



# ご聴講はありがとうございました!!