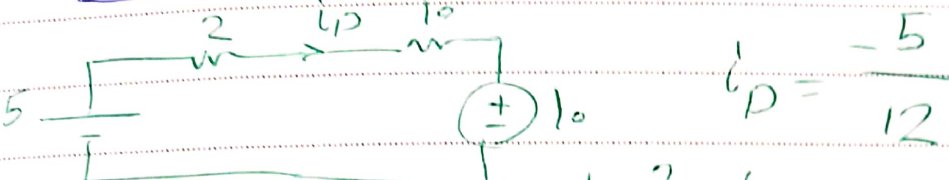
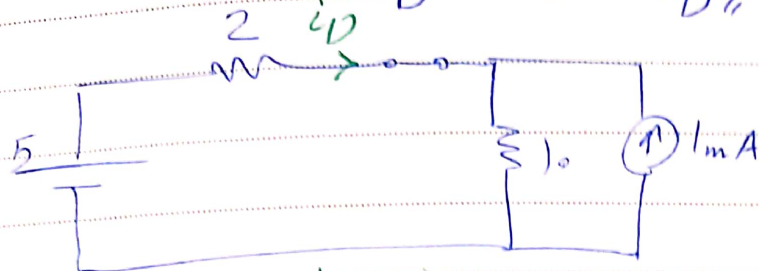


۱. دین ریدایه روست باشد $V_D = 0$ ، $i_D > 0$

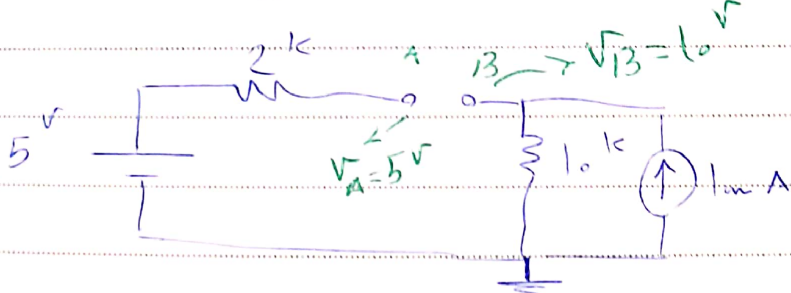


$$i_D = \frac{-5}{12}$$

دین روست است پس دود خاصیت است

(اتصال کردیم)

۲. اگر دین روست داریم باید خاصیت است $V_D < 0$ ، $i_D = 0$

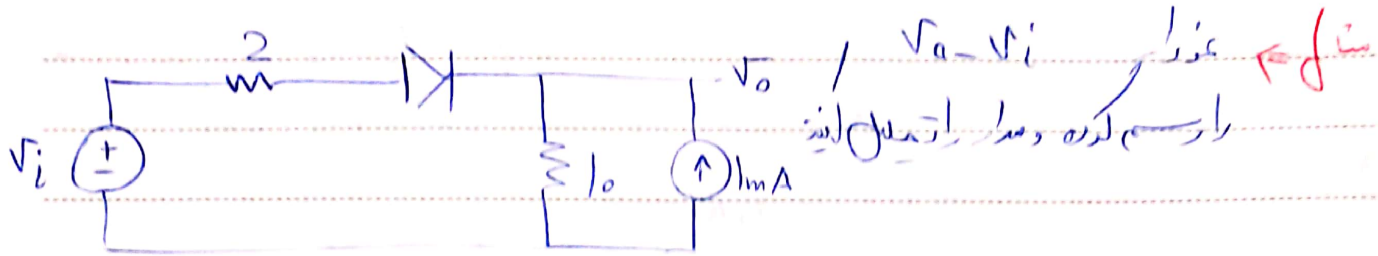


$$V_D = V_A - V_B = 5 - 10 = -5$$

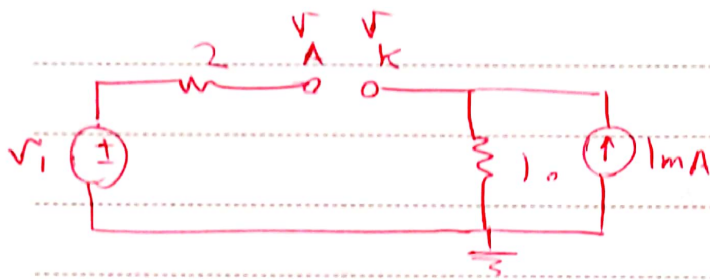
دین روست است

دور = 0n ، $i > 0$ ، $V = 0$

دور = 0pf ، $i = 0$ ، $V < 0$



در حالت قطع



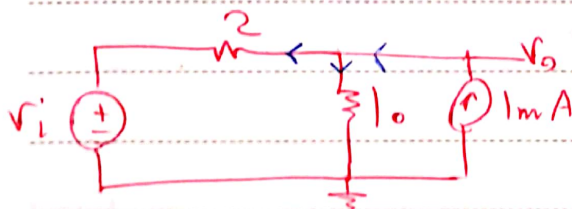
$$V_A = V_i$$

$$V_K = 10$$

$$V_D = V_A - V_K = V_i - 10$$

$$V_D < 0 \Rightarrow V_i - 10 < 0 \Rightarrow V_i < 10$$

در حالت روشن

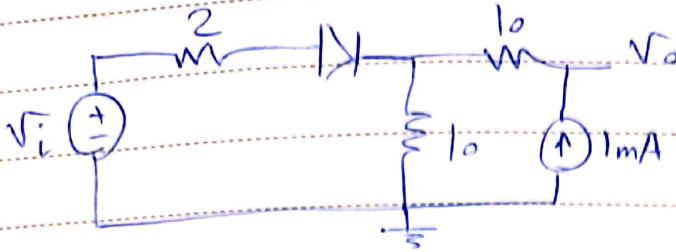


$$\frac{V_o - V_i}{2} + \frac{V_o}{10} - 1 = 0$$

$$V_o = \frac{1}{0.6} + \frac{1}{1.2} V_i$$

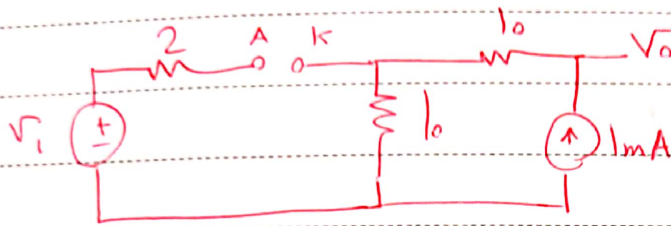
V_o

V_i



مسئله ۱
فرضه $v_i - v_o$ را همواره
مثبت و تحلیل کنید

1) : off

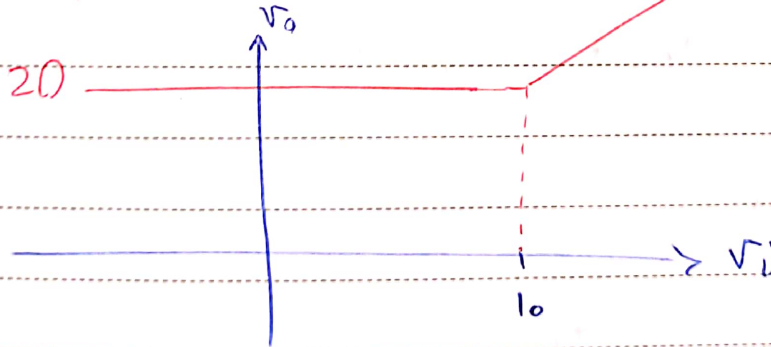


$$V_A = V_i$$

$$V_K = 10V$$

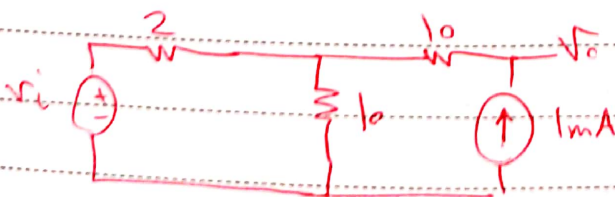
$$V_D = V_A - V_K = V_i - 10$$

$$V_i \leq 10, \quad V_o = 20$$



2) : on

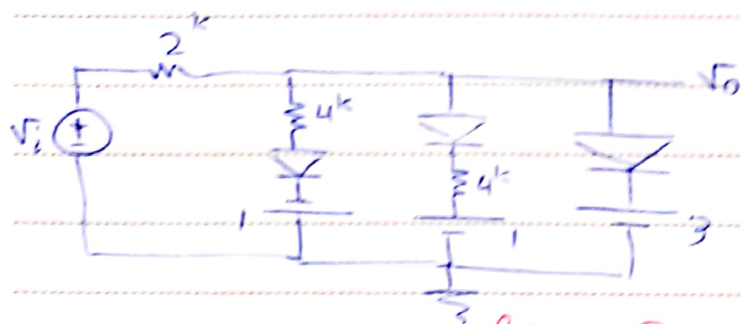
$$V_i > 10$$



$$I = 0 \quad V_o = \frac{10}{12} V_i$$

$$V = 0 \quad V_o = \frac{V_o}{4} V$$

$$V_o = \frac{10}{12} V_i + \frac{V_o}{4}$$



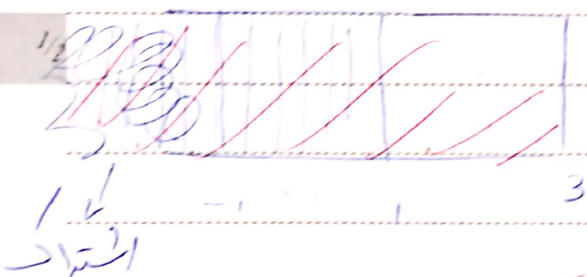
$v_i = -2$ $D_1 = \text{on}$ $D_2, D_3 = \text{off}$

$v_i = v_o$

$v_{D1} = v_i - (-1) \leq 0 \Rightarrow v_i \leq -1$ $-v_i + v_{D1} - 1 = 0$

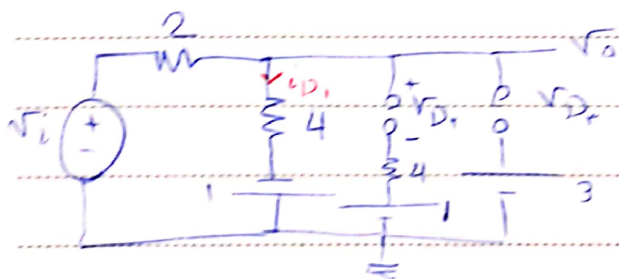
$v_{D2} = v_i - 1 \Rightarrow v_i \leq 1$ $-v_i + v_{D2} + 1 = 0$

$v_{D3} = v_i - 3 \leq 0 \Rightarrow v_i \leq 3$ $-v_i + v_{D3} + 3 = 0$



$-1 < v_i$

$D_1 = \text{on}, D_2 = \text{off}, D_3 = \text{off}$



$i_{D1} = \frac{v_i + 1}{8}$ $v_o = -1 + 4i_{D1}$

$-v_i + 2i_{D1} + 4i_{D1} - 1 = 0$

$= v_i - 2i_{D1}$

$v_{D2} = v_o - 1$

$\frac{4}{4+2} (v_i + 1) - 1$

$-1 - v_{D2} + v_o = 0$

$v_o = \left(\frac{1}{3} v_i - \frac{1}{3} \right)$

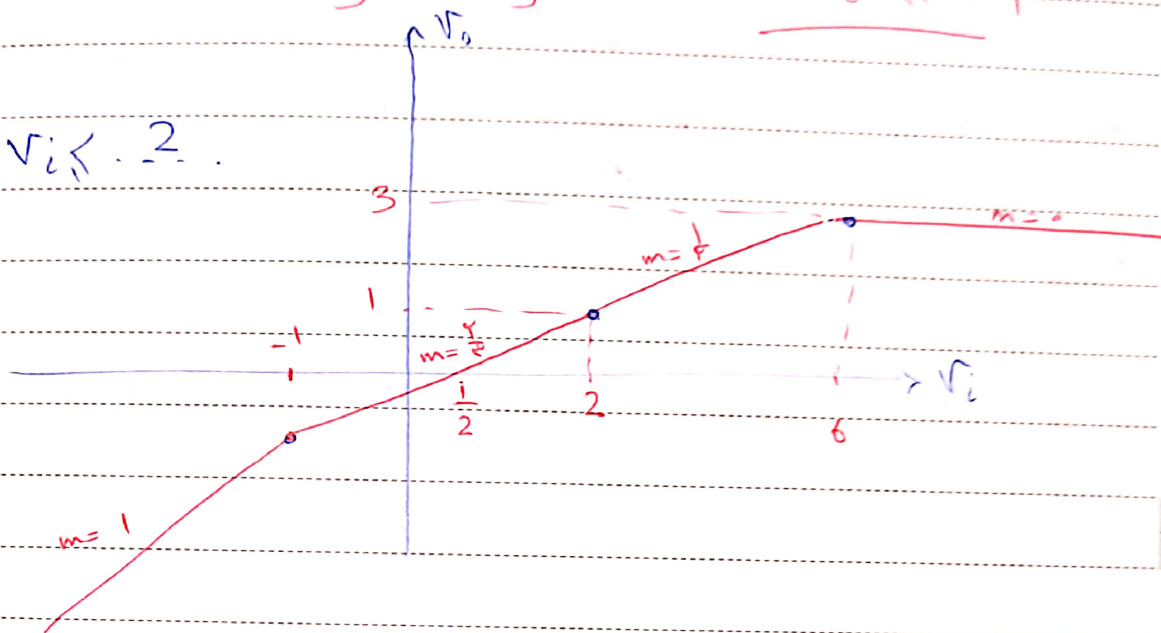
$$V_{D1} = \frac{2}{3} V_i - \frac{1}{3} - 1$$

$$\frac{2}{3} V_i - \frac{4}{3} \leq 0 \rightarrow \boxed{V_i \leq 2}$$

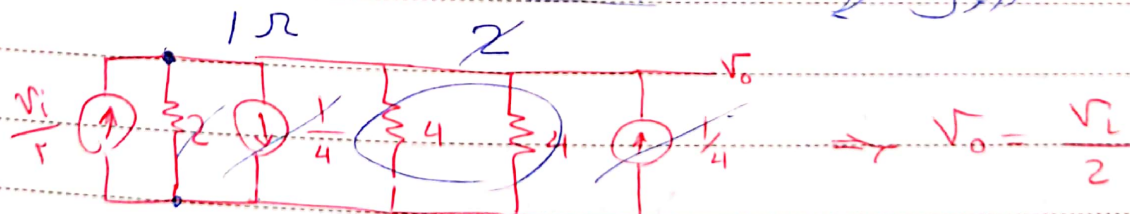
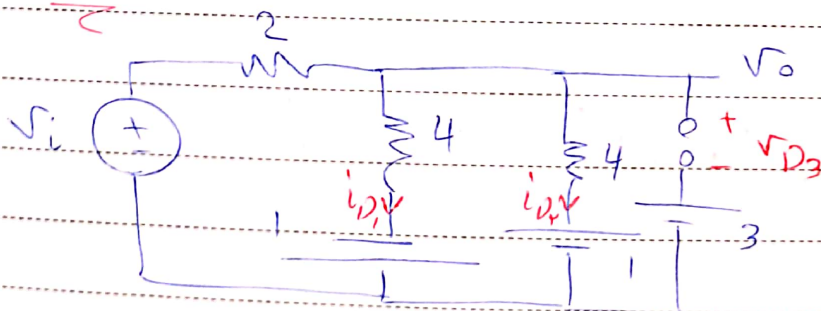
$$1.2 \Omega > \boxed{V_i \leq 2}$$

$$V_{D3} = V_0 - 3 \rightarrow \frac{2}{3} V_i - \frac{1}{3} - 3 \leq 0 \Rightarrow \boxed{V_i \leq 5}$$

$$-1 \leq V_i \leq 2$$



$$2 \leq V_i \dots D_1 = \text{on}, D_2 = \text{on}, D_3 = \text{off}$$



$$i_{D1} = \frac{V_0 - (-1)}{4} = \frac{V_i/2 + 1}{4} > 0$$

$$i_{D1} = \frac{v_o - 1}{4} = \frac{v_i/2 - 1}{4}$$

$$i_{D3} = v_o - 3 = \frac{v_i}{2} - 3 \leq 0$$

$$v_i \leq 6$$

$$2 \leq v_i \leq 6$$

4

$$6 \leq v_i$$

$$D_1 = on, D_2 = on, D_3 = on$$

has

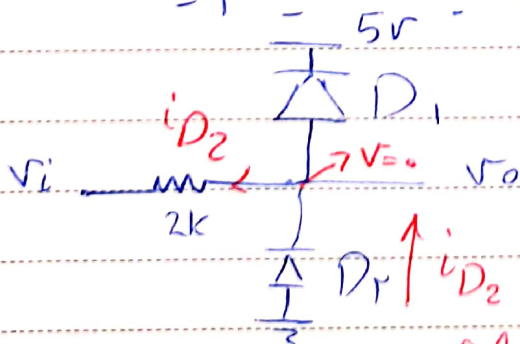
$$v_o = 3^v$$

در این حالت، ولتاژ خروجی 3 ولت است و ولتاژ ورودی 6 ولت است.

kazemi_mv@yahoo.com

Prin. of Elec.

در این حالت، ولتاژ خروجی 3 ولت است و ولتاژ ورودی 6 ولت است.



$$v_i = -1 \quad D_1: off \quad D_2: on$$

$$v_o = 0 \quad i_{D2} = -\frac{v_i}{2} \Rightarrow v_i \leq 0$$

$$v_{D_1} = v_0 - 5 = -5 < 0 \quad \checkmark \quad D_1 \text{ on } D_2 \text{ off}$$

D_1 on D_2 off

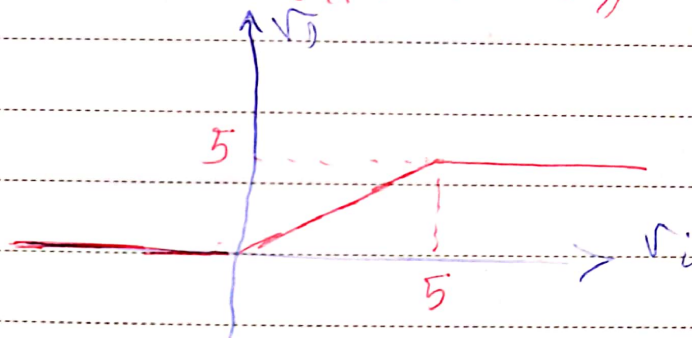
$$v_i \geq 0 \quad D_1 = 0 \text{ off} \quad D_2 = 0 \text{ off}$$

for v_i

$$v_0 = v_i$$

$$v_{D_1} = v_0 - 5 = v_i - 5 < 0 \rightarrow v_i < 5$$

$$v_{D_2} = v - v_0 = -v_i < 0 \rightarrow v_i > 0$$



$$v_i \geq 5$$

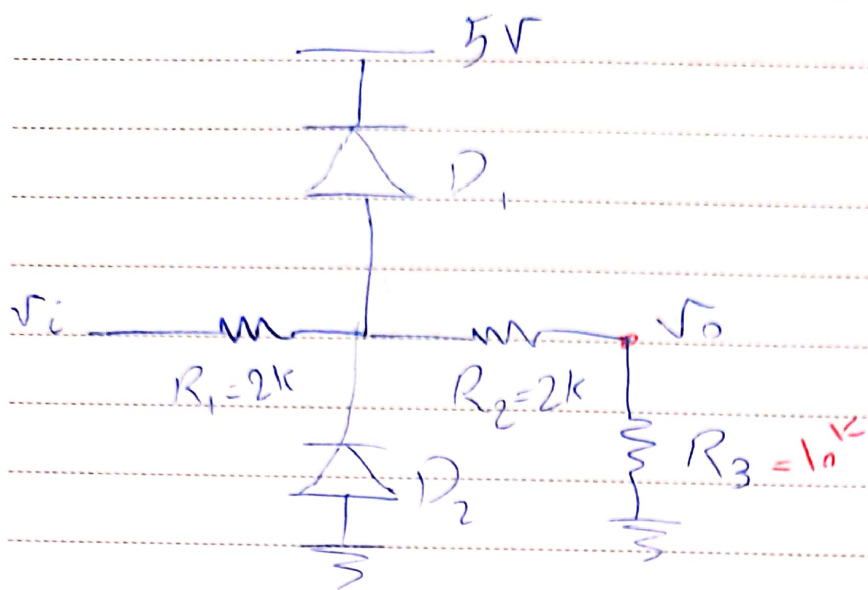
for v_i

$$D_1 = \text{on}, D_2 = 0 \text{ off}$$

$$v_0 = 5$$

$$v_{D_1} = \frac{v_i - 5}{2} > 0 \quad v_i > 5$$

$$v_{D_2} = v - v_0 = -v_0 = -5 < 0 \quad \checkmark$$



$$V_i = -\infty \rightarrow D_1 \text{ is off}, D_2 \text{ is on}$$

$$V_{D_2} = 0 \rightarrow V_o = 0$$

$$i_{D_2} = \frac{-V_i}{2} > 0 \rightarrow V_i < 0$$

$$V_{D_1} = 0 - 5 = -5 < 0$$

For

$$V_i > 0 \quad D_1 \text{ is on}, D_2 \text{ is off}$$

$$V_o = \frac{R_3}{R_1 + R_2 + R_3} V_i = \frac{10}{14} V_i$$

$$V_{D_2} = 0 - V_o = -\frac{12}{14} V_i < 0 \rightarrow D_2 \text{ is off}$$

$$V_{D_1} = V_o - 5 = \frac{12}{14} V_i - 5 < 0$$

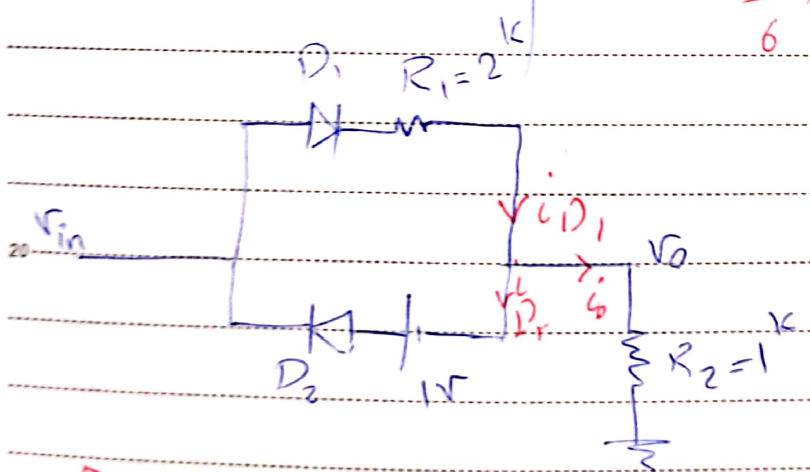
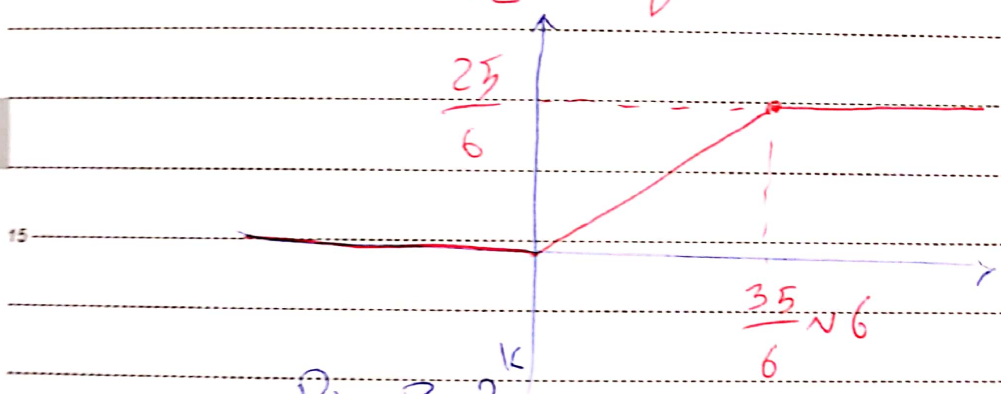
$$\frac{12}{14} v_i - 5 < 0 \Rightarrow v_i < \frac{35}{6} \approx 6$$

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$$\frac{35}{6} < v_i \quad D_1 = on \quad D_2 = off$$

$$v_o = ? = \frac{10}{11} v_i$$

$$\left(\frac{10}{11}\right) 5 = \frac{50}{12} = \frac{25}{6}$$



$$v_i = -\infty \quad D_1 = off \quad D_2 = on$$

$$v_o = v_i - 1 \quad / \quad -v_i + 1 = v_o$$

$$i_{D2} = -\frac{v_o}{R_2} = -\frac{v_i - 1}{1} > 0 \Rightarrow v_i < 1$$