ERT 15

Ομάδα 5)

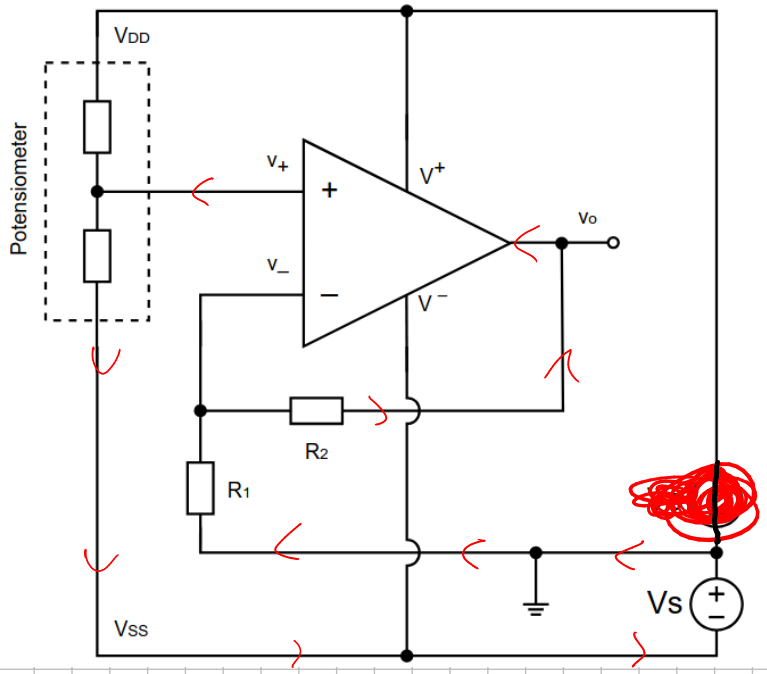
(α) $$a = \frac{y_1 - y_2}{x_1 - x_2} = \frac{4950 - (-4950)}{2475 - (-2475)} = 2$$

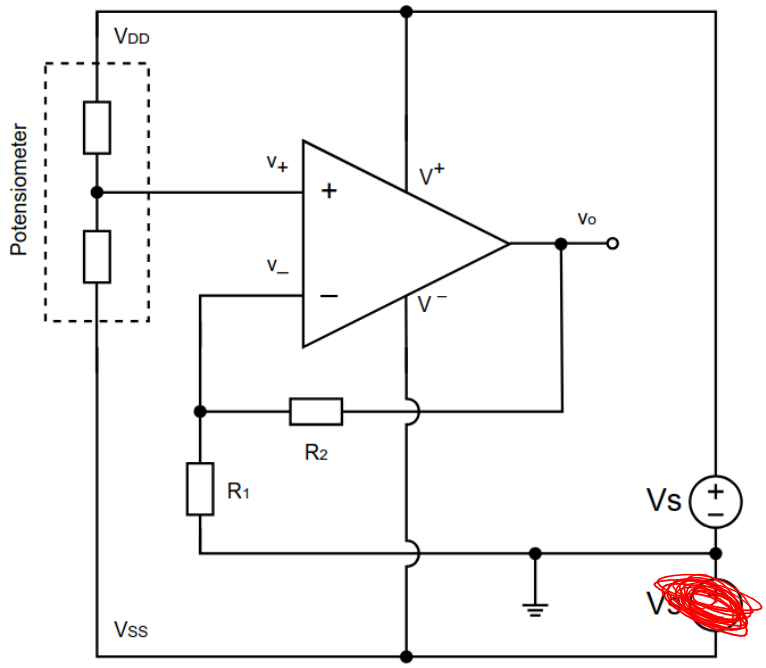
$$y = y_1 + a(x - x_1)$$
$$= 4950 + 2(x - 2475)$$
$$= 4950 - 4950 + 2x$$
$$= 2x$$

$$U_0(U_i) = \begin{cases} -5000, & U_i < -2475 \\ 2U_i, & 2475 > U_i > -2475 \\ 5000, & U_i > 2475 \end{cases}$$

Orig 8

b)


VDD
Potensiometer
v+
V+
+
Vo
v_
–
V –
R2
R1
Vs
+
–
Vss


VDD
Potensiometer
v+
V+
+
Vo
v_
–
V –
R2
R1
Vs
+
–
Vss

Ons 10)

a) $v_0 = A(v_i - v_x)$

b) $v_x = R_1 \cdot I \qquad I = \frac{V}{R_T}$

$v_x = R_1 \frac{v_0}{R_T}$

$v_x = R_1 \frac{v_0}{R_1 + R_2}$

c) $v_0 = A(v_i - v_x)$

$= A v_i - A v_x$

$= A v_i - A R_1 \frac{v_0}{R_1 + R_2}$

$v_0 + A R_1 \frac{v_0}{R_1 + R_2} = A v_i$

$v_0 \left(1 + A R_1 \frac{1}{R_1 + R_2}\right) = A v_i$

$$v_0 = \frac{A}{1 + A R_1 \frac{1}{R_1 + R_2}} \cdot v_i$$

$$v_0 = \frac{1}{\frac{1}{A} + \frac{R_1}{R_1 + R_2}} \cdot v_i$$

d) $$v_0 = \frac{1}{\frac{1}{A} + \frac{R_1}{R_1 + R_2}} \cdot v_i$$

$$= \left(\frac{1}{A} + \frac{R_1}{R_1 + R_2}\right)^{-1} \cdot v_i$$

$$= \left(\frac{R_1 + R_2 + A R_1}{A(R_1 + R_2)}\right)^{-1} \cdot v_i$$

$$= \lim_{A \to \infty} \left(\frac{\frac{R_1}{A} + \frac{R_2}{A} + R_1}{R_1 + R_2}\right)^{-1} \cdot v_i$$

$$= \left(\frac{R_1}{R_1 + R_2}\right)^{-1} \cdot v_i$$

$$= \left(\frac{R_1 + R_2}{R_1} \right) \cdot U_1$$

$$= \left(1 + \frac{R_2}{R_1} \right) \cdot U_1$$

e)