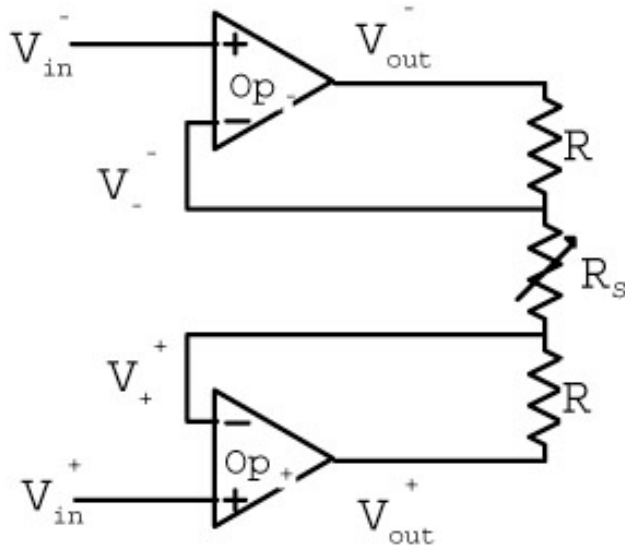


Introducción a la electrónica – 6.071

Soluciones a la prueba n.º 4

1.)



$$V_{out}^- = V_{in}^-$$

$$V_{out}^+ = V_{in}^+$$

$$V_{out}^- = V_{out}^- + \frac{(V_{out}^- - V_{out}^+)R}{2R + R_s}$$

$$V_{out}^+ = V_{out}^+ + \frac{(V_{out}^- - V_{out}^+)R}{2R + R_s}$$

$$V_{out}^+ \left[\frac{R}{2R + R_s} \right] + V_{out}^- \left[\frac{R}{2R + R_s} \right] = V_{in}^+$$

$$V_{out}^- \left[\frac{R}{2R + R_s} \right] + V_{out}^+ \left[\frac{R}{2R + R_s} \right] = V_{in}^-$$

$$(V_{out}^+ - V_{out}^-) \left[\frac{R}{2R + R_s} \right] + (V_{out}^- - V_{out}^+) \left[\frac{R}{2R + R_s} \right] = V_{in}^+ - V_{in}^-$$

$$(V_{out}^+ - V_{out}^-) \left[\frac{R}{2R + R_s} \right] - (V_{out}^- - V_{out}^+) \left[\frac{R}{2R + R_s} \right] = V_{in}^+ - V_{in}^-$$

$$1 \left[\frac{2R}{2R + R_s} \right] = \frac{R_s}{2R + R_s}$$

$$4ai.) V_{out} = \square \frac{V_{ref}}{2R} 2R = \square V_{ref}$$

$$4aii.) V_{out} = \square \frac{V_{ref}}{2}$$

4b.) Resolución: 4 bits; D_0 es el LSB; D_3 es el MSB.

5.)

A	B	\bar{A}	$\bar{A}B$	$A + \bar{A}B$	A+B
0	0	1	0	0	0
0	1	1	1	1	1
1	0	0	0	1	1
1	1	0	0	1	1

$$6a.) 972_{10} = 0011\ 1100\ 1100_2 = 1001\ 0111\ 0010_{BCD} = 1714_8 = 3CC_{16}$$

$$6b.) 1011\ 1100_2 = 188_{10} = BC_{16}$$

7a.)

$$\begin{aligned} x_1 &= \overline{\overline{AB} \cdot (A + B)} \\ &= \overline{\overline{AB} + \overline{A + B}} \quad ; \quad x_2 = \overline{AB + \overline{A + B}} \quad ; \quad \square x_1 = x_2 \\ &= \overline{AB + \overline{A} \cdot \overline{B}} \quad ; \quad = \overline{AB + \overline{A} \cdot \overline{B}} \\ &= AB + \overline{A} \cdot \overline{B} \quad = AB + \overline{A} \cdot \overline{B} \end{aligned}$$

$$7bi.) x = \overline{\overline{AB} + \overline{A(A + C)}}$$

7bii.)

$$\begin{aligned} x &= \overline{\overline{AB} + \overline{A(A + C)}} \\ &= \overline{\overline{A} \cdot \overline{B} + \overline{A} + \overline{A(A + C)}} \\ &= \overline{\overline{A} \cdot \overline{B} + \overline{A} + \overline{A} \cdot \overline{A} \cdot \overline{C}} \\ &= \overline{\overline{A} \cdot \overline{B} + \overline{A} + A \cdot \overline{C}} \\ &= \overline{\overline{A}(1 + 1) + B + A \cdot \overline{C}} \\ &= \overline{\overline{A} + B + A \cdot \overline{C}} \\ &= \overline{\overline{A} + A \cdot \overline{C} + B} \\ &= \overline{\overline{A} + \overline{C} + B} \\ &= \overline{A \cdot \overline{C} + B} \end{aligned}$$

