Solution 2.

The operation is associative.

$$(a == b) = (\bar{a} + b).(a + \bar{b}) = \bar{a}\bar{b} + ab = \overline{a \oplus b}$$

<u>LHS</u>

$$((a == b) == c) = (\overline{a == b})\bar{c} + (a == b)c = (a \oplus b)\bar{c} + (\overline{a \oplus b})c$$
$$= (a\bar{b} + \bar{a}b)\bar{c} + (\bar{a}\bar{b} + ab)c = a\bar{b}\bar{c} + \bar{a}b\bar{c} + \bar{a}\bar{b}c + abc.$$

<u>RHS</u>

$$(a == (b == c)) = \bar{a}(\overline{b == c}) + a(b == c) = \bar{a}(b \oplus c) + a(\overline{b \oplus c})$$
$$= \bar{a}(b\bar{c} + \bar{b}c) + a(\bar{b}\bar{c} + bc) = \bar{a}b\bar{c} + \bar{a}\bar{b}c + a\bar{b}\bar{c} + abc.$$