

Logic design (2016 fall)

Quiz # 3

Name: _____ ID: _____

1. (50%) Eliminate the exclusive OR, and then factor to obtain a minimum product of sums

$$(KL \oplus M) + M'N'$$

$$\begin{aligned} & (KL \oplus M) + M'N' \\ &= (KL)'M + KLM' + M'N' \\ &= (K' + L')M + KLM' + M'N' \\ &= M(K' + L') + M'(KL + N') \\ &= (M' + K' + L')(M + N' + KL) \\ &= (M' + K' + L')(M + N' + K)(M + N' + L) \end{aligned}$$

2. (50%) Determine the following equation is always valid or not with algebraic proof

$$ABC + A'C'D' + A'BD' + ACD = (A' + C)(A + D')(B + C' + D)$$

$$\begin{aligned} \text{LHS} &: ABC + A'C'D' + A'BD' + ACD \\ &= AC(B + D) + A'D'(B + C') \\ &= (A + D')(B + C')(A' + C(B + D)) \\ &= (A + D')(A + B + C')(A' + C)(A' + B + D) \\ &= (A + D')(A + B + C')(A' + C)(A' + B + D)(B + C' + D) \\ &= (A + D')(A + B + C')(A' + C)(B + C' + D) \\ &= (A + D')(A' + C)(B + C' + D) \text{ RHS} \end{aligned}$$