Dernière mise à jour : 16 septembre 2015

Exercices chapitre 6

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## Simplification d'une expression algébrique

|  |  |  |  |
| --- | --- | --- | --- |
|  | Simplifier l’expression suivante:Z = A + B . A + C . C + A |  |  |
| ***Réponse(s) :*** *Z = A + B* | *SP* |
|  | Simplifier l’expression suivante:Z = (A + A B) (C + C D) |  |  |
| ***Réponse(s) :*** *Z = A (C+D)* | *SP* |
|  | Simplifier l’expression suivante:Z = (A + A B) (C + C D) |  |  |
| ***Réponse(s) :*** *Z = (A+B) C* | *SP* |
|  | Simplifier l’expression suivante:Z = (AC + ACD + ABC + ABCD ) |  |  |
| ***Réponse(s) :*** *Z = A (C+D)* | *SP* |
|  | Simplifier l’expression suivante:Z = (AC + ACD + AC + ACD ) |  |  |
| ***Réponse(s) :*** *Z = A (C+D)* | *SP* |
|  | Simplifier l’expression suivante:Z = C A + B + B + A |  |  |
| ***Réponse(s) :*** *Z = A+B* | *SP* |
|  | Simplifier l’expression suivante:Z = (AB + C).( D + AB) |  |  |
| ***Réponse(s) :*** *Z = AB+CD* | *SP* |
|  | Simplifier l’expression suivante:Z = C A + B + B + A |  |  |
| ***Réponse(s) :*** *Z = A+B+C* | *SP* |

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| --- | --- | --- | --- |
|  | Simplifier l’expression suivante:Z = ABC + ABC + ABC |  |  |
| ***Réponse(s) :*** *Z = A(B+C)* | *SP* |
|  | Simplifier l’expression suivante:Z = (A + B).(A + B + D) D |  |  |
| ***Réponse(s) :*** *Z = BD* | *SP* |
|  | Simplifier l’expression suivante :  Y = ABC + ABC + ABC + ABC  |  |  |
| ***Réponse(s) :*** *Z = C(B+A)+AB* | *ETML* |
|  | Simplifier l’expression suivante :  Y = ABC + ABC + ABC + ABC  |  |  |
| ***Réponse(s) :*** *Z = C(B+A)+AB* | *ETML* |
|  | Simplifier l’expression suivante :  Y = ABC + ABC + ABC |  |  |
| ***Réponse(s) :*** *Z = C(A+B)* | *SP* |
|  | Simplifier l’expression suivante :  Y = ABC + ABC + ABC |  |  |
| ***Réponse(s) :*** *Z = A(B+C)* | *SP* |
|  | Simplifier l’expression suivante :  Y = ( A + B + C ) ( A + B + C ) A | 1 |  |
| ***Réponse(s) :*** *Z = AC* | *SP* |
|  | Simplifier l’expression suivante :  Y = ( A + B + C ) ( A + B + C ) B | 1 |  |
| ***Réponse(s) :*** *Z = AB* | *SP* |
|  | Simplifier l’expression suivante :  S = (A + B) . (A + C)  |  |  |
| ***Réponse(s) :*** *S = A ( B + C)*  | *SP* |
|  | Simplifier l’expression suivante :  S = A + B + C |  |  |
| ***Réponse(s) :*** *S = C (A + B)*  | *SP* |

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|  |  |  |  |
| --- | --- | --- | --- |
|  | Simplifier l’expression suivante :  S = A . B + C . D |  |  |
| ***Réponse(s) :*** *S = (A + B) CD* | *SP* |
|  | Simplifier l’expression suivante :  S = (A + B + C) . ( A + B + C ) |  |  |
| ***Réponse(s) :*** *S = B + ( A + C)* | *SP* |
|  | Simplifier l’expression suivante :  S = A B C + A B C + AB C +A B C |  |  |
| ***Réponse(s) :*** *S = A B + C ( A + B)* | *SP* |
|  | Simplifier l’expression suivante :  S = A C ( A B D ) + A B C D + A B C |  |  |
| ***Réponse(s) :*** *S = B C + A D ( B + C )* | *SP* |
|  | Simplifier l’expression suivante:Z = A + C + C  | 1 |  |
| ***Réponse(s) :*** *Z = 1* | *YMR* |
|  | Simplifier l’expression suivante:Z = A · C · C  | 1 |  |
| ***Réponse(s) :*** *Z = 0* | *YMR* |
|  | Simplifier l’expression suivante:Z = (A + A B) (C + C D) | 2 |  |
| ***Réponse(s) :*** *Z = (A+B) C* | *YMR* |
|  | Simplifier l’expression suivante:Z = (A + A B) (C + C D) | 2 |  |
| ***Réponse(s) :*** *Z = A (C+D)* | *YMR* |
|  | Simplifier l’expression suivante:Z = C A + B + B | 2 |  |
| ***Réponse(s) :*** *Z = C+A+B* | *YMR* |
|  | Simplifier l’expression suivante:Z = A B + C + B | 2 |  |
| ***Réponse(s) :*** *Z = A+C+B* | *YMR* |

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|  |  |  |  |
| --- | --- | --- | --- |
|  | Simplifier l’expression suivante :  S = A + B + C | 1 |  |
| ***Réponse(s) :*** *S = C (A + B)*  | *YMR* |
|  | Simplifier l’expression suivante :  S = C + B + A | 1 |  |
| ***Réponse(s) :*** *S = A (C + B)*  | *YMR* |
|  | Simplifier l’expression suivante:Z = A + (B ∙ B) ∙ (CD + D) ∙ DE  | 2 |  |
| ***Réponse(s) :*** *Z = A* | *YMR* |
|  | Simplifier l’expression suivante:Z = (A ∙ A) ∙ (CD + D) ∙ DE + B | 2 |  |
| ***Réponse(s) :*** *Z = B* | *YMR* |
|  | Simplifier l’expression suivante: | 2 |  |
| ***Réponse(s) :*** | *SEP* |
|  | Simplifier l’expression suivante: | 2 |  |
| ***Réponse(s) :***Z=A | *SEP* |

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## Simplification d'un circuit logique

|  |  |  |  |
| --- | --- | --- | --- |
|  | Extraire l'expression algébrique, puis la simplifier |  |  |
| ***Réponse(s) :*** *X = A ( B + C )* | *ETML* |
|  | Extraire l'expression algébrique, puis la simplifier A B1&S& | 2 |  |
| ***Réponse(s) :*** *S = A*· *B* · *A = 1* | *YMR* |
|  | Extraire l'expression algébrique, puis la simplifier A B1≥ 1S≥ 1 | 2 |  |
| ***Réponse(s) :*** *S = A*+*B*+*A = 0* | *YMR* |

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## Expression algébrique à partir d'une Tdv

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  | Extraire la fonction "S" par mintermes (sans simplification)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | D | S |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 0 |

 |  |  |
| ***Réponse(s) :*** *S = ABCD + ABCD + ABCD* | *SP* |
|  | Extraire la fonction "S" par mintermes (sans simplification)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | D | S |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 0 |

 |  |  |
| ***Réponse(s) :*** *S = ABCD + ABCD + ABCD* | *SP* |

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|  | Extraire la fonction "S" par maxtermes (sans simplification)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D | C | B | A | S |
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |

 |  |  |
| ***Réponse(s) :*** *S = (A+B+C+D) .(A+B+C+D)* | *SP* |
|  | Extraire la fonction "S" par maxtermes (sans simplification)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| D | C | B | A | S |
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |

 |  |  |
| ***Réponse(s) :*** *S = (A+B+C+D) .(A+B+C+D)* | *SP* |

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## Universalité des portes NAND

|  |  |  |  |
| --- | --- | --- | --- |
|  | Transformer l'expression algébrique suivante, puis réaliser le circuit en n'utilisant que des portes NAND à 2 entrées Z = P + Q R |  |  |
| ***Réponse(s) :*** *Z = P QR* | *SP* |
|  | Transformer l'expression algébrique suivante, puis réaliser le circuit en n'utilisant que des portes NAND à 2 entrées Z = A ( B + C )  |  |  |
| ***Réponse(s) :*** *Z = A B C* | *SP* |
|  | Transformer l'expression algébrique suivante, puis réaliser le circuit en n'utilisant que des portes NAND à 2 entrées Z = A B + A B  |  |  |
| ***Réponse(s) :*** *Z = A B A B*  | *SP* |

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## Universalité des portes NOR

|  |  |  |  |
| --- | --- | --- | --- |
|  | Transformer l'expression algébrique suivante, puis réaliser le circuit en n'utilisant que des portes NOR Z = P + Q R |  |  |
| ***Réponse(s) :*** *Z = P + Q + R* | *SP* |
|  | Transformer l'expression algébrique suivante, puis réaliser le circuit en n'utilisant que des portes NOR Z = A ( B + C )  |  |  |
| ***Réponse(s) :*** *Z = A + B + C* | *SP* |
|  | Transformer l'expression algébrique suivante, puis réaliser le circuit en n'utilisant que des portes NOR Z = A B + A B  |  |  |
| ***Réponse(s) :*** *Z = A +B + A+B*  | *SP* |

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