

# Generator Pairs for all 4x4 GF(2) Representations of S4

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## 1 Introduction

These pairs were generated by enumerating all order 3 and all order 4 4x4 GF(2) matrices. Each pair was expanded into a group by computing all products of the pair. If the resulting group was of size 24, the group and all of its conjugates were saved in a list. When a new pair was expanded, it was tested against the list of groups already found. If the new group was not in the list, the pair was saved as a new pair.

Subsequently each pair was expanded, and the resultant group was tested for isomorphism with  $S_4$ . Every pair except Pair 6 passed this test. (Pair 6 generates a rotational group of size 24.)

## 2 Pair 1

0001  
0010  
0100  
1010

0001  
0100  
0010  
1011

## 3 Pair 2

0001  
0010  
0100  
1010

0011  
1101  
1011  
0001

**4 Pair 3**

0001  
0010  
0100  
1010

1000  
0010  
0110  
0011

**5 Pair 4**

0001  
0010  
0100  
1110

0001  
0011  
0101  
1111

**6 Pair 5**

0001  
0010  
0100  
1110

0001  
0100  
0010  
1001

**7 Pair 6**

Does not exist.

**8 Pair 7**

0001  
0010  
0100  
1110

1000  
0010  
0110  
0101

**9 Pair 8**

0100  
0010  
0001  
1000

0100  
0010  
1000  
0001

**10 Pair 9**

0001  
0010  
0100  
1110

0001  
0010  
1011  
1110

**11 Pair 10**

0001  
0010  
0100  
1010

0001  
0010  
0110  
1001