

ЗАДАНИЕ №2, 1-й курс мкн

Даны две системы векторов a_1, a_2, a_3, a_4 и b_1, b_2, b_3 пространства R^4 , на которые натянуты линейные подпространства L_1 и L_2 соответственно.

1) Найти максимальную линейно независимую подсистему системы векторов a_1, a_2, a_3, a_4 и выразить все векторы системы линейно через векторы найденной подсистемы;

2) Показать, что b_1, b_2, b_3 - базис подпространства L_2 и найти координаты вектора c в этом базисе;

3) Найти базис пересечения подпространств L_2 и L_1 ;

4) Найти базис какого-нибудь подпространства L , для которого выполняется равенство $R^4 = (L_1 \cap L_2) \oplus L$

1. $\{a_1 = \{-1, -2, -2, -1\}, a_2 = \{-2, -2, 0, 0\}, a_3 = \{1, -2, -1, 0\},$
 $a_4 = \{2, -2, 1, 0\}, b_1 = \{1, 1, 1, 0\}, b_2 = \{-2, 2, 0, -1\}, b_3 = \{-2, 1, 0, 1\}\},$

2. $\{a_1 = \{1, -2, 1, 2\}, a_2 = \{-2, 1, -2, 0\}, a_3 = \{2, 0, -1, -1\}, a_4 = \{2, 2, 0, 1\},$
 $b_1 = \{-1, 1, -2, 0\}, b_2 = \{1, 2, -1, 2\}, b_3 = \{0, 2, -2, 0\}\},$

3. $\{a_1 = \{0, 0, 1, -2\}, a_2 = \{-2, 0, 0, 1\}, a_3 = \{-2, 1, -1, 2\}, a_4 = \{-2, -2, 1, 0\},$
 $b_1 = \{-1, 2, 1, 1\}, b_2 = \{2, 2, -2, 2\}, b_3 = \{1, -1, 1, 2\}\},$

4. $\{a_1 = \{1, 1, 1, -1\}, a_2 = \{0, 0, 0, 2\}, a_3 = \{0, -1, 0, -1\}, a_4 = \{2, 2, -2, 2\},$
 $b_1 = \{0, 1, -2, 1\}, b_2 = \{-1, 0, 2, -1\}, b_3 = \{1, 1, -2, -1\}\},$

5. $\{a_1 = \{-1, 2, 0, 0\}, a_2 = \{1, 2, 0, -2\}, a_3 = \{-2, -2, 1, -1\}, a_4 = \{2, 0, 1, 1\},$
 $b_1 = \{-2, -1, 2, 0\}, b_2 = \{-1, -1, 1, 2\}, b_3 = \{0, 1, -2, 2\}\},$

6. $\{a_1 = \{0, 0, -2, 2\}, a_2 = \{1, -1, 2, 1\}, a_3 = \{-2, 0, -2, -1\}, a_4 = \{-2, 2, 0, -1\},$
 $b_1 = \{0, 1, 0, 1\}, b_2 = \{1, 1, 2, -2\}, b_3 = \{2, -1, 1, -2\}\},$

7. $\{a_1 = \{-1, -2, 0, 2\}, a_2 = \{2, 0, -2, 0\}, a_3 = \{0, 2, -1, -1\}, a_4 = \{1, 2, 2, -1\},$
 $b_1 = \{2, -2, -2, 2\}, b_2 = \{0, 1, 2, 2\}, b_3 = \{0, -2, 2, 1\}\},$

8. $\{a_1 = \{1, 1, -2, 1\}, a_2 = \{0, 0, 1, -2\}, a_3 = \{-1, 0, 1, -2\}, a_4 = \{0, 2, 2, -1\},$
 $b_1 = \{2, -1, 2, 1\}, b_2 = \{2, 2, 1, -1\}, b_3 = \{-1, 1, 2, -2\}\},$

9. $\{a_1 = \{1, 0, -1, 1\}, a_2 = \{-2, 0, -1, 1\}, a_3 = \{-2, 1, -1, 0\}, a_4 = \{1, -2, 0, 1\},$
 $b_1 = \{0, 1, 1, 2\}, b_2 = \{-1, 0, -2, 0\}, b_3 = \{-2, 0, 1, 2\}\},$

10. $\{a_1 = \{0, 0, -1, -2\}, a_2 = \{2, 2, 2, 0\}, a_3 = \{0, 1, -2, -2\}, a_4 = \{0, -1, 0, 0\},$
 $b_1 = \{1, 1, 2, 1\}, b_2 = \{0, 2, 2, -2\}, b_3 = \{-1, -2, -1, -1\}\},$

11. $\{a_1 = \{-2, 2, -2, 1\}, a_2 = \{2, 0, -1, 2\}, a_3 = \{-1, 1, -2, -1\}, a_4 = \{-1, 2, 2, 2\},$
 $b_1 = \{0, 1, 2, 0\}, b_2 = \{0, -1, 0, 2\}, b_3 = \{1, 1, -2, 2\}\},$

12. $\{a_1 = \{-2, -1, 2, 0\}, a_2 = \{-2, 2, 2, -1\}, a_3 = \{2, 2, -1, 1\}, a_4 = \{2, -2, 0, -2\},$
 $b_1 = \{2, 2, 1, 1\}, b_2 = \{0, 1, -1, 0\}, b_3 = \{1, -2, -2, -1\}\},$

$$13. \{a_1 = \{-1, -1, -1, 0\}, a_2 = \{0, 2, 0, -2\}, a_3 = \{0, 0, 1, -2\}, a_4 = \{1, -2, -2, -1\}, \\ b_1 = \{1, 2, 1, -2\}, b_2 = \{2, 0, 1, -1\}, b_3 = \{0, 2, 0, -2\}\},$$

$$14. \{a_1 = \{-2, 2, 2, -1\}, a_2 = \{-1, 2, 1, 1\}, a_3 = \{-1, 2, -2, 0\}, a_4 = \{0, 1, -1, -2\}, \\ b_1 = \{-2, -2, 2, -2\}, b_2 = \{-1, 0, -2, 0\}, b_3 = \{1, 0, 2, 2\}\},$$

$$15. \{a_1 = \{0, -1, 1, 0\}, a_2 = \{1, -1, 1, 0\}, a_3 = \{2, -1, 2, 0\}, a_4 = \{1, 1, -1, -1\}, \\ b_1 = \{-2, -1, -1, -2\}, b_2 = \{-1, -2, 0, 0\}, b_3 = \{2, 2, 0, -2\}\},$$

$$16. \{a_1 = \{1, 1, 0, 0\}, a_2 = \{2, 1, -2, -1\}, a_3 = \{1, 1, 1, 1\}, a_4 = \{2, -1, 1, 1\}, \\ b_1 = \{0, -1, 1, 2\}, b_2 = \{1, -2, -2, -2\}, b_3 = \{-2, -2, 2, 2\}\},$$

$$17. \{a_1 = \{2, 2, -2, -1\}, a_2 = \{1, -1, 1, 1\}, a_3 = \{1, 0, 1, -1\}, a_4 = \{2, 0, 0, 2\}, \\ b_1 = \{1, 1, -1, -2\}, b_2 = \{-2, 1, -1, 1\}, b_3 = \{0, 2, 0, -1\}\},$$

$$18. \{a_1 = \{-1, -1, 2, -1\}, a_2 = \{-2, -2, -2, 0\}, a_3 = \{1, 1, 1, 1\}, a_4 = \{1, -1, -1, -1\}, \\ b_1 = \{-2, 2, -1, 1\}, b_2 = \{0, 2, 1, -2\}, b_3 = \{-1, 2, -1, 2\}\},$$

$$19. \{a_1 = \{-1, 2, -2, 2\}, a_2 = \{-1, -2, 0, 2\}, a_3 = \{-1, 0, -2, 2\}, a_4 = \{1, 0, -2, 2\}, \\ b_1 = \{1, 0, -2, 2\}, b_2 = \{-2, -1, -2, -2\}, b_3 = \{0, -1, 0, -1\}\},$$

$$20. \{a_1 = \{-1, -1, -1, 1\}, a_2 = \{-2, -1, -2, 1\}, a_3 = \{-2, -1, 1, 1\}, a_4 = \{-2, 0, 1, 0\}, \\ b_1 = \{-2, -1, 0, -1\}, b_2 = \{-2, 1, -2, -2\}, b_3 = \{2, -2, -1, -1\}\},$$

$$21. \{a_1 = \{2, 1, -1, -2\}, a_2 = \{-1, 1, -1, 1\}, a_3 = \{1, -2, -1, 2\}, a_4 = \{0, 0, 1, 2\}, \\ b_1 = \{1, 2, -1, 0\}, b_2 = \{-2, 0, -2, 2\}, b_3 = \{1, -1, -2, -2\}\},$$

$$22. \{a_1 = \{0, 2, 2, 2\}, a_2 = \{1, -2, 2, 0\}, a_3 = \{-1, -1, 2, -1\}, a_4 = \{1, -2, 1, -2\}, \\ b_1 = \{2, -2, 0, -1\}, b_2 = \{0, -1, -2, 2\}, b_3 = \{-1, 2, -1, 2\}\},$$

$$23. \{a_1 = \{1, 2, 0, 0\}, a_2 = \{-1, -2, -1, -1\}, a_3 = \{2, -1, 2, 2\}, a_4 = \{-2, 1, 2, -1\}, \\ b_1 = \{2, 0, 0, 1\}, b_2 = \{2, 1, 2, 1\}, b_3 = \{0, -1, -2, -2\}\},$$

$$24. \{a_1 = \{-1, 2, -2, -2\}, a_2 = \{-1, 2, -2, -1\}, a_3 = \{2, -1, -2, -2\}, a_4 = \{1, 2, 1, 0\}, \\ b_1 = \{-1, 1, 0, 0\}, b_2 = \{2, 2, -1, 0\}, b_3 = \{2, -1, 0, -1\}\},$$

$$25. \{a_1 = \{0, -1, 0, -1\}, a_2 = \{0, 1, -2, 0\}, a_3 = \{-1, -2, -2, 0\}, a_4 = \{-1, 0, -1, 0\}, \\ b_1 = \{-2, 0, 1, 1\}, b_2 = \{0, 0, -2, 0\}, b_3 = \{1, 2, 1, -1\}\}$$