Решение системы линейных уравнений методом Гаусса (множество решений)

Пожалуйста, обратите внимание, что коэффициенты расположенные на "красных" позициях исчезают.

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| Знак системы |  | 2 | x1 | + | 3 | x2 | - |  | x3 | + |  | x4 | = | 1 |
|  | 8 | x1 | + | 12 | x2 | - | 9 | x3 | + | 8 | x4 | = | 3 |
|  | 4 | x1 | + | 6 | x2 | + | 3 | x3 | - | 2 | x4 | = | 3 |
|  | 2 | x1 | + | 3 | x2 | + | 9 | x3 | - | 7 | x4 | = | 3 |

К уравнению 2 прибавляем уравнение 1, умноженное на -4.

( 8 x1 + 2 x1 \* ( -4) )

+ ( 12 x2 + 3 x2 \* ( -4) )

+ ( -9 x3 + ( - x3) \* ( -4) )

+ ( 8 x4 + x4 \* ( -4) )

= 3 + 1 \* ( -4)

"Красный" коэффициент равен нулю.

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| Знак системы |  | 2 | x1 | + | 3 | x2 | - |  | x3 | + |  | x4 | = | 1 |
|  |  |  |  |  |  | - | 5 | x3 | + | 4 | x4 | = | - 1 |
|  | 4 | x1 | + | 6 | x2 | + | 3 | x3 | - | 2 | x4 | = | 3 |
|  | 2 | x1 | + | 3 | x2 | + | 9 | x3 | - | 7 | x4 | = | 3 |

К уравнению 3 прибавляем уравнение 1, умноженное на -2.

( 4 x1 + 2 x1 \* ( -2) )

+ ( 6 x2 + 3 x2 \* ( -2) )

+ ( 3 x3 + ( - x3) \* ( -2) )

+ ( -2 x4 + x4 \* ( -2) )

= 3 + 1 \* ( -2)

"Красный" коэффициент равен нулю.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Знак системы |  | 2 | x1 | + | 3 | x2 | - |  | x3 | + |  | x4 | = | 1 |
|  |  |  |  |  |  | - | 5 | x3 | + | 4 | x4 | = | - 1 |
|  |  |  |  |  |  |  | 5 | x3 | - | 4 | x4 | = | 1 |
|  | 2 | x1 | + | 3 | x2 | + | 9 | x3 | - | 7 | x4 | = | 3 |

К уравнению 4 прибавляем уравнение 1, умноженное на -1

( 2 x1 + 2 x1 \* ( -1) )

+ ( 3 x2 + 3 x2 \* ( -1) )

+ ( 9 x3 + ( - x3) \* ( -1) )

+ ( -7 x4 + x4 \* ( -1) )

= 3 + 1 \* ( -1)

"Красный" коэффициент равен нулю.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Знак системы |  | 2 | x1 | + | 3 | x2 | - |  | x3 | + |  | x4 | = | 1 |
|  |  |  |  |  |  | - | 5 | x3 | + | 4 | x4 | = | - 1 |
|  |  |  |  |  |  |  | 5 | x3 | - | 4 | x4 | = | 1 |
|  |  |  |  |  |  |  | 10 | x3 | - | 8 | x4 | = | 2 |

К уравнению 3 прибавляем уравнение 2.

( 5 x3 + ( -5 x3) )

+ ( -4 x4 + 4 x4 )

= 1 + ( -1)

"Красный" коэффициент равен нулю.

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| Знак системы |  | 2 | x1 | + | 3 | x2 | - |  | x3 | + |  | x4 | = | 1 |
|  |  |  |  |  |  | - | 5 | x3 | + | 4 | x4 | = | - 1 |
|  |  |  |  |  |  |  |  |  |  |  | 0 | = | 0 |
|  |  |  |  |  |  |  | 10 | x3 | - | 8 | x4 | = | 2 |

К уравнению 4 прибавляем уравнение 2, умноженное на 2.

( 10 x3 + ( -5 x3) \* 2 )

+ ( -8 x4 + 4 x4 \* 2 )

= 2 + ( -1) \* 2

"Красный" коэффициент равен нулю.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Знак системы |  | 2 | x1 | + | 3 | x2 | - |  | x3 | + |  | x4 | = | 1 |
|  |  |  |  |  |  | - | 5 | x3 | + | 4 | x4 | = | - 1 |
|  |  |  |  |  |  |  |  |  |  |  | 0 | = | 0 |
|  |  |  |  |  |  |  |  |  |  |  | 0 | = | 0 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Знак системы |  | 2 | x1 | + | 3 | x2 | - |  | x3 | + |  | x4 | = | 1 |
|  |  |  |  |  |  | - | 5 | x3 | + | 4 | x4 | = | - 1 |

Из уравнения 2 системы найдем значение переменной x3.

- 5 x3 + 4 x4 = - 1

x3 = 1/5 + 4/5 x4

Из уравнения 1 системы найдем значение переменной x1.

2 x1 + 3 x2 - x3 + x4 = 1

2 x1 = 1 - 3 x2 + x3 - x4

2 x1 = 1 - 3 x2 + ( 1/5 + 4/5 x4 ) - x4

x1 = 3/5 - 3/2 x2 - 1/10 x4

Ответ:

x1 = 3/5 - 3/2 x2 - 1/10 x4

x3 = 1/5 + 4/5 x4