

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	2
3	1
4	2
5	2
6	4
7	2
8	2
9	1
10	1
11	1
12	1
13	1
14	2
15	1
16	1

Rs 16 - Soln 1

$$\text{rank}(\text{kron}(\text{eye}(4), 6) - \text{kron}(6', \text{eye}(4))) = 10$$

$$\text{rank}([\text{kron}(\text{eye}(4), 6) - \text{kron}(6', \text{eye}(4)); \text{kron}(\text{eye}(4), 2) - \text{kron}(4', \text{eye}(4))]) = 16$$

$$\text{rank}([\text{kron}(\text{eye}(4), 6) - \text{kron}(6', \text{eye}(4)); \text{kron}(\text{eye}(4), 2) - \text{kron}(5', \text{eye}(4))]) = 15$$

$$\text{rank}([\text{kron}(\text{eye}(4), 6) - \text{kron}(6', \text{eye}(4)); \text{kron}(\text{eye}(4), 2) - \text{kron}(7', \text{eye}(4))]) = 14$$

$$\text{rank}([\text{kron}(\text{eye}(4), 6) - \text{kron}(6', \text{eye}(4)); \text{kron}(\text{eye}(4), 2) - \text{kron}(8', \text{eye}(4))]) = 16$$

$$\text{rank}([\text{kron}(\text{eye}(4), 6) - \text{kron}(6', \text{eye}(4)); \text{kron}(\text{eye}(4), 2) - \text{kron}(14', \text{eye}(4))]) = 16$$

$$\text{rank}([\text{kron}(\text{eye}(4), 6) - \text{kron}(6', \text{eye}(4)); \text{kron}(\text{eye}(4), 4) - \text{kron}(14', \text{eye}(4))]) = 15$$

$$2 \Leftrightarrow 5 \Leftrightarrow 7$$

$$4 \Leftrightarrow 14$$

8 by itself (multiple of the identity)

$$[U, S, V] = \text{svd}([\text{kron}(\text{eye}(4), 6) - \text{kron}(6', \text{eye}(4)); \text{kron}(\text{eye}(4), \text{reshape}(\text{Rs16Rc1111}(:, 8), 4, 4)) - \text{kron}(\text{reshape}(\text{Rs16Rc1111}(:, 8), 4, 4)', \text{eye}(4))]); V(:, \text{end})$$

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	1
3	2
4	2
5	2
6	4
7	2
8	1
9	1
10	1
11	1
12	2
13	1
14	2
15	1
16	1

Rs 16 - Soln 2

$3 \Leftrightarrow 4 \Leftrightarrow 5 \Leftrightarrow 14$

7 and 12 by themselves

12 is not the identity times a constant!

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	2
3	2
4	1
5	2
6	1
7	1
8	1
9	1
10	1
11	1
12	2
13	2
14	4
15	2
16	1

Rs 16 - Soln 3

$2 \Leftrightarrow 3 \Leftrightarrow 5 \Leftrightarrow 12 \Leftrightarrow 13 \Leftrightarrow 15$

All related!?

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	2
3	2
4	1
5	2
6	1
7	1
8	1
9	2
10	1
11	2
12	2
13	1
14	4
15	1
16	1

Rs 16 - Soln 4

2 11 12

3 9

5 is by itself, not a multiple of the identity!

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	1
3	2
4	1
5	2
6	1
7	2
8	2
9	2
10	1
11	1
12	1
13	1
14	2
15	1
16	4

Rs 16 - Soln 5

$3 \Leftrightarrow 5 \Leftrightarrow 7 \Leftrightarrow 14$
 8 9

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	1
4	1
5	2
6	1
7	2
8	1
9	1
10	2
11	2
12	1
13	4
14	1
15	1
16	2

Rs 16 - Soln 6

1 7 10 16

5 by itself (multiple of the identity)

11 by itself (multiple of the identity)

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	1
4	2
5	2
6	1
7	4
8	1
9	1
10	2
11	2
12	1
13	2
14	1
15	1
16	1

Rs 16 - Soln 7

1 10 11 13

5 is by itself (not a multiple of the identity)

4 is by itself (multiple of the identity)

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	2
4	4
5	1
6	2
7	2
8	1
9	1
10	2
11	1
12	2
13	1
14	1
15	1
16	1

Rs 16 - Soln 8 1 3 7 12
6 10

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	2
3	1
4	1
5	4
6	2
7	1
8	2
9	1
10	2
11	1
12	2
13	1
14	1
15	2
16	1

Rs 16 - Soln 9

2 8 10 12

6 is by itself (multiple of the identity)

15 is by itself (multiple of the identity)

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	1
4	1
5	2
6	1
7	1
8	1
9	1
10	2
11	2
12	1
13	2
14	4
15	1
16	2

Rs 16 - Soln 10
1 13 16 5 10 11 All related

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	1
4	4
5	2
6	1
7	1
8	1
9	2
10	1
11	2
12	1
13	2
14	1
15	2
16	1

Rs 16 - Soln 11

1 5 9 11 13 15 All related (all odds)

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	4
3	2
4	1
5	1
6	1
7	1
8	1
9	2
10	1
11	1
12	2
13	2
14	2
15	1
16	2

Rs 16 - Soln 12

3 13 14

9 16

12 is by itself (multiple of the identity)

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	1
3	1
4	4
5	2
6	1
7	1
8	1
9	2
10	2
11	2
12	2
13	1
14	2
15	1
16	1

Rs 16 - Soln 13

5 is by itself (not a multiple of the)
9 10 11 12 14

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	1
4	1
5	2
6	2
7	2
8	4
9	1
10	1
11	1
12	2
13	2
14	1
15	1
16	1

Rs 16 - Soln 14

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	2
4	2
5	1
6	1
7	1
8	1
9	1
10	2
11	4
12	1
13	1
14	2
15	2
16	1

Rs 16 - Soln 15

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	1
4	2
5	1
6	1
7	1
8	1
9	1
10	2
11	2
12	1
13	1
14	2
15	2
16	4

Rs 16 - Soln 16

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	2
3	1
4	2
5	1
6	1
7	2
8	1
9	2
10	1
11	2
12	2
13	1
14	4
15	1
16	1

Rs 16 - Soln 17

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	1
3	1
4	1
5	2
6	1
7	2
8	1
9	1
10	1
11	2
12	2
13	2
14	4
15	2
16	1

Rs 16 - Soln 18

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	4
4	2
5	2
6	1
7	2
8	1
9	1
10	1
11	2
12	1
13	2
14	1
15	1
16	1

Rs 16 - Soln 19

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	2
4	1
5	1
6	1
7	1
8	1
9	1
10	2
11	2
12	2
13	4
14	2
15	1
16	1

Rs 16 - Soln 20

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	4
3	2
4	2
5	1
6	2
7	1
8	2
9	2
10	1
11	1
12	1
13	1
14	1
15	1
16	1

Rs 16 - Soln 21

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	1
3	1
4	2
5	1
6	1
7	2
8	1
9	4
10	1
11	1
12	2
13	2
14	2
15	2
16	1

Rs 16 - Soln 22

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	2
3	2
4	1
5	4
6	2
7	1
8	1
9	1
10	1
11	2
12	2
13	2
14	1
15	1
16	1

Rs 16 - Soln 23

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	4
3	1
4	2
5	1
6	2
7	1
8	2
9	1
10	2
11	1
12	2
13	1
14	1
15	1
16	1

Rs 16 - Soln 24

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	1
4	2
5	1
6	1
7	1
8	2
9	1
10	1
11	4
12	1
13	2
14	1
15	2
16	2

Rs 16 - Soln 25

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	4
3	2
4	1
5	1
6	1
7	2
8	2
9	1
10	1
11	1
12	1
13	2
14	1
15	1
16	2

Rs 16 - Soln 26

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	2
3	4
4	1
5	1
6	1
7	2
8	2
9	1
10	1
11	2
12	1
13	2
14	1
15	2
16	1

Rs 16 - Soln 27

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	2
3	2
4	1
5	1
6	1
7	2
8	1
9	1
10	1
11	2
12	2
13	2
14	1
15	1
16	4

Rs 16 - Soln 28

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	2
4	2
5	2
6	2
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	4
16	2

Rs 16 - Soln 29

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	4
4	1
5	1
6	2
7	2
8	2
9	1
10	1
11	1
12	1
13	1
14	2
15	2
16	1

Rs 16 - Soln 30

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	2
2	1
3	1
4	2
5	2
6	1
7	2
8	1
9	1
10	2
11	1
12	1
13	4
14	1
15	2
16	1

Rs 16 - Soln 31

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	1
2	4
3	1
4	1
5	1
6	2
7	1
8	1
9	2
10	2
11	2
12	2
13	1
14	1
15	2
16	1

Rs 16 - Soln 32

Type	Char. Poly.	Count
name-1		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11
name-2		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11
name-3		
symmetric	$t^3(t-1)$	9
	$(t-1)^2(t+t^2+1)$	1
	$t^2(t+t^2+1)$	6
triples	$\{t^4, t^4, t^4\}$	11

Col Number	Rank
1	4
2	2
3	2
4	2
5	2
6	1
7	1
8	1
9	2
10	1
11	1
12	1
13	2
14	1
15	1
16	1

Rs 16 - Soln 1

2, 3, 4, 5, 9, 13

Type	Char. Poly.	Count
name-1		
symmetric	$(t-1)^4$	1
triples	$\{t^3(t-1), t^3(t-1), t^3(t+1)\}$	4
	$\{t^3(t-1), t^3(t-1), t^4\}$	1
	$\{t^3(t-1), t^3(t+1), t^4\}$	3
	$\{t^3(t-1), t^4, t^4\}$	1
	$\{t^3(t+1), t^3(t+1), t^4\}$	1
	$\{t^3(t+1), t^3(t+2), t^4\}$	1
	$\{t^3(t+1), t^4, t^4\}$	1
	$\{t^2+t^4, t^2(t^2-t+1), t^2(t+1)^2\}$	1
	$\{t^2+t^4, t^2(t^2-1), t^4-t^2\}$	1
	$\{t^2(t-1)^2, t^2(t-1)^2, t^2(t+1)^2\}$	2

Col Number	Rank
1	4

Rs 1 - Soln 1

Type	Char. Poly.	Count
name-1		
symmetric	$(t-1)^4$	1
triples	$\{t^3(t-1), t^3(t-1), t^3(t+1)\}$	2
	$\{t^3(t-1), t^3(t-1), t^3(t+2)\}$	1
	$\{t^3(t-1), t^3(t-1), t^4\}$	2
	$\{t^3(t-1), t^3(t+1), t^3(t-2)\}$	1
	$\{t^3(t-1), t^3(t+1), t^4\}$	3
	$\{t^3(t+1), t^3(t+1), t^4\}$	3
	$\{t^2(t-1)^2, t^2(t-1)^2, t^2(t+1)^2\}$	1
	$\{t^2(t-1)^2, -t^2(t-t^2+1), -t^2(t-t^2+1)\}$	1
	$\{t^2(t+1)^2, t^2(t+1)^2, t^2(t+1)^2\}$	1
	$\{t^2(t+1)^2, t^4-t^2, t^4-t^2\}$	1

Col Number	Rank
1	4

Rs 1 - Soln 2

Type	Char. Poly.	Count
name-1		
symmetric	$(t-1)^4$	1
triples	$\{t^3(t-1), t^3(t-1), t^3(t-1)\}$	2
	$\{t^3(t-1), t^3(t-1), t^3(t+1)\}$	1
	$\{t^3(t-1), t^3(t-1), t^4\}$	1
	$\{t^3(t-1), t^3(t+1), t^3(t+1)\}$	5
	$\{t^3(t-1), t^3(t+1), t^3(t-2)\}$	1
	$\{t^3(t-1), t^3(t+1), t^4\}$	2
	$\{t^2(t-1)^2, t^2(t-1)^2, t^2(t+1)^2\}$	2
	$\{t^2(t-1)^2, t^4-t^2, t^4-t^2\}$	1
	$\{t^2(t+1)^2, t^2(t+1)^2, t^2(t+1)^2\}$	1

Col Number	Rank
1	4

Rs 1 - Soln 3

Type	Char. Poly.	Count
name-1		
symmetric	$(t-1)^4$	1
triples	$\{t^3(t-1), t^3(t-1), t^3(t-1)\}$	2
	$\{t^3(t-1), t^3(t-1), t^3(t+1)\}$	3
	$\{t^3(t-1), t^3(t-1), t^4\}$	1
	$\{t^3(t-1), t^3(t+1), t^3(t+1)\}$	1
	$\{t^3(t-1), t^3(t+1), t^3(t-2)\}$	1
	$\{t^3(t-1), t^3(t+1), t^4\}$	1
	$\{t^3(t+1), t^3(t+1), t^3(t+1)\}$	2
	$\{t^3(t+1), t^3(t+1), t^4\}$	1
	$\{t^2(t-1)^2, t^2(t-1)^2, t^2(t+1)^2\}$	2
	$\{t^2(t-1)^2, t^4-t^2, t^4-t^2\}$	1
	$\{t^2(t+1)^2, t^4-t^2, t^4-t^2\}$	1

Col Number	Rank
1	4

Rs 1 - Soln 4

Type	Char. Poly.	Count
name-1		
symmetric	$(t-1)^4$	1
triples	$\{t^3(t-1), t^3(t-1), t^3(t+1)\}$	1
	$\{t^3(t-1), t^3(t-1), t^4\}$	1
	$\{t^3(t-1), t^3(t+1), t^3(t+1)\}$	2
	$\{t^3(t-1), t^3(t+1), t^4\}$	4
	$\{t^3(t+1), t^3(t+1), t^3(t+1)\}$	1
	$\{t^3(t+1), t^3(t+1), t^3(t+2)\}$	2
	$\{t^3(t+1), t^3(t+1), t^4\}$	1
	$\{t^2(t-1)^2, t^2(t-1)^2, t^2(t+1)^2\}$	2
	$\{t^2(t-1)^2, t^4-t^2, t^4-t^2\}$	1
	$\{t^2(t+1)^2, t^4-t^2, t^4-t^2\}$	1

Col Number	Rank
1	4

Rs 1 - Soln 5

Type	Char. Poly.	Count
name-1		
symmetric	$(t-1)^4$	1
triples	$\{t^3(t-1), t^3(t-1), t^3(t-1)\}$	2
	$\{t^3(t-1), t^3(t+1), t^3(t+1)\}$	4
	$\{t^3(t-1), t^3(t+1), t^3(t-2)\}$	1
	$\{t^3(t-1), t^3(t+1), t^4\}$	3
	$\{t^3(t+1), t^3(t+1), t^4\}$	2
	$\{t^2(t^2-t+1), t^4-t^2, t^2(t+t^2-1)\}$	1
	$\{t^2(t-1)^2, t^2(t-1)^2, t^2(t+1)^2\}$	2
	$\{t^2(t+1)^2, t^2(t+1)^2, t^2(t+1)^2\}$	1

Col Number	Rank
1	4

Rs 1 - Soln 6

Type	Char. Poly.	Count
name-1		
symmetric	$(t-1)^4$	1
triples	$\{t^3(t-1), t^3(t-1), t^3(t-1)\}$	4
	$\{t^3(t-1), t^3(t+1), t^3(t+1)\}$	8
	$\{t^2(t-1)^2, t^2(t-1)^2, t^2(t+1)^2\}$	4

Col Number	Rank
1	4

Strassen - Rs1 Rc16