Университет ИТМО

**Домашняя работа №3**

**КОНСТРУКТОРСКО-ТЕХНОЛОГИЧЕСКОЕ ОБЕСПЕЧЕНИЕ ПРОИЗВОДСТВА ЭВМ**

Вариант 16

Выполнил:

студент гр. P3415

Припадчев Артём

Санкт-Петербург

2016

**Матрица смежности Q**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **u1** | **u2** | **u3** | **u4** | **u5** | **u6** | **u7** | **u8** | **u9** | **u10** | **u11** | **u12** | **u13** | **u14** | **u15** | **u16** | **u17** | **u18** | **u19** | **u20** | **u21** | **u22** |
| **e1** | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| **e2** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **e3** | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **e4** | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| **e5** | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| **e6** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| **e7** | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| **e8** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| **e9** | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| **e10** | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| **e11** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| **e12** | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Матрица комплексов R**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **e1** | **e2** | **e3** | **e4** | **e5** | **e6** | **e7** | **e8** | **e9** | **e10** | **e11** | **e12** |
| **e1** | **0** | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| **e2** | 1 | **0** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| **e3** | 1 | 0 | **0** | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| **e4** | 1 | 0 | 0 | **0** | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| **e5** | 1 | 0 | 1 | 1 | **0** | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| **e6** | 0 | 1 | 0 | 0 | 1 | **0** | 0 | 0 | 0 | 0 | 0 | 1 |
| **e7** | 0 | 0 | 0 | 1 | 0 | 0 | **0** | 1 | 0 | 1 | 1 | 1 |
| **e8** | 0 | 0 | 0 | 1 | 1 | 0 | 1 | **0** | 0 | 0 | 1 | 1 |
| **e9** | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | **0** | 1 | 1 | 1 |
| **e10** | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | **0** | 1 | 1 |
| **e11** | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | **0** | 1 |
| **e12** | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | **0** |

**Гамильтонов цикл**

S = {e2, e1, e3, e5, e4, e7, e8, e11, e9, e10, e12, e6}

Новые номера вершин:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| e1 | e2 | e3 | e4 | e5 | e6 | e7 | e8 | e9 | e10 | e11 | e12 | Новые |
| e2 | e1 | e3 | e5 | e4 | e7 | e8 | e11 | e9 | e10 | e12 | e6 | Старые |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **e1** | **e2** | **e3** | **e4** | **e5** | **e6** | **e7** | **e8** | **e9** | **e10** | **e11** | **e12** |
| **e1** | **0** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| **e2** | 1 | **0** | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| **e3** | 0 | 1 | **0** | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| **e4** | 0 | 1 | 1 | **0** | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| **e5** | 0 | 1 | 0 | 1 | **0** | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| **e6** | 0 | 0 | 0 | 0 | 1 | **0** | 1 | 1 | 0 | 1 | 1 | 0 |
| **e7** | 0 | 0 | 0 | 1 | 1 | 1 | **0** | 1 | 0 | 0 | 1 | 0 |
| **e8** | 0 | 1 | 0 | 0 | 1 | 1 | 1 | **0** | 1 | 1 | 1 | 0 |
| **e9** | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | **0** | 1 | 1 | 0 |
| **e10** | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | **0** | 1 | 0 |
| **e11** | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | **0** | 1 |
| **e12** | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | **0** |

Пересечения ребер:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2-11** |  | 1-10 |  |  |  |  |  |  |  |  |  |  |  |
| **3-10** |  | 2-4 | 2-5 | 2-8 |  |  |  |  |  |  |  |  |  |
| **3-9** |  | 2-4 | 2-5 | 2-8 |  |  |  |  |  |  |  |  |  |
| **4-12** |  | 2-5 | 2-8 | 3-9 | 1-10 | 2-10 | 3-10 | 1-11 | 2-11 |  |  |  |  |
| **4-10** |  | 2-5 | 2-8 | 3-9 |  |  |  |  |  |  |  |  |  |
| **4-9** |  | 2-5 | 2-8 |  |  |  |  |  |  |  |  |  |  |
| **4-7** |  | 2-5 |  |  |  |  |  |  |  |  |  |  |  |
| **5-11** |  | 4-7 | 2-8 | 3-9 | 4-9 | 1-10 | 2-10 | 3-10 | 4-10 |  |  |  |  |
| **5-10** |  | 4-7 | 2-8 | 3-9 | 4-9 |  |  |  |  |  |  |  |  |
| **5-9** |  | 4-7 | 2-8 |  |  |  |  |  |  |  |  |  |  |
| **5-8** |  | 4-7 |  |  |  |  |  |  |  |  |  |  |  |
| **6-11** |  | 4-7 | 5-7 | 2-8 | 5-8 | 3-9 | 4-9 | 5-9 | 1-10 | 2-10 | 3-10 | 4-10 | 5-10 |
| **6-10** |  | 4-7 | 5-7 | 2-8 | 5-8 | 3-9 | 4-9 | 5-9 |  |  |  |  |  |
| **6-8** |  | 4-7 | 5-7 |  |  |  |  |  |  |  |  |  |  |
| **7-11** |  | 2-8 | 5-8 | 6-8 | 3-9 | 4-9 | 5-9 | 1-10 | 2-10 | 3-10 | 4-10 | 5-10 | 6-10 |
| **8-11** |  | 3-9 | 4-9 | 5-9 | 1-10 | 2-10 | 3-10 | 4-10 | 5-10 | 6-10 |  |  |  |
| **8-10** |  | 3-9 | 4-9 | 5-9 |  |  |  |  |  |  |  |  |  |
| **9-11** |  | 1-10 | 2-10 | 3-10 | 4-10 | 5-10 | 6-10 | 8-10 |  |  |  |  |  |

Нумерация ребер:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-11 | 3-10 | 3-9 | 4-12 | 4-10 | 4-9 | 4-7 | 5-11 | 5-10 | 5-9 | 5-8 | 6-11 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6-10 | 6-8 | 7-11 | 8-11 | 8-10 | 9-11 | 1-10 | 2-4 | 2-5 | 2-8 | 2-10 | 1-11 | 5-7 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** |
| **1** | **1** |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |
| **2** |  | **1** |  | 1 |  |  |  | 1 |  |  |  | 1 |  |  |  | 1 |  | 1 |  | 1 | 1 | 1 |  |  |  |
| **3** |  |  | **1** | 1 | 1 |  |  | 1 | 1 |  |  | 1 | 1 |  |  | 1 | 1 |  |  | 1 | 1 | 1 |  |  |  |
| **4** | 1 | 1 | 1 | **1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 1 | 1 | 1 | 1 |  |
| **5** |  |  | 1 |  | **1** |  |  | 1 |  |  |  | 1 |  |  |  | 1 |  | 1 |  |  | 1 | 1 |  |  |  |
| **6** |  |  |  |  |  | **1** |  | 1 | 1 |  |  | 1 | 1 |  |  | 1 | 1 |  |  |  | 1 | 1 |  |  |  |
| **7** |  |  |  |  |  |  | **1** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |  |  |  |  | 1 |  |  |  |  |
| **8** |  | 1 | 1 |  | 1 | 1 | 1 | **1** |  |  |  |  |  |  |  |  |  |  | 1 |  |  | 1 | 1 |  |  |
| **9** |  |  | 1 |  |  | 1 | 1 |  | **1** |  |  | 1 |  |  |  | 1 |  | 1 |  |  |  | 1 |  |  |  |
| **10** |  |  |  |  |  |  | 1 |  |  | **1** |  | 1 | 1 |  |  | 1 | 1 |  |  |  |  | 1 |  |  |  |
| **11** |  |  |  |  |  |  | 1 |  |  |  | **1** | 1 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| **12** |  | 1 | 1 |  | 1 | 1 | 1 |  | 1 | 1 | 1 | **1** |  |  |  |  |  |  | 1 |  |  | 1 | 1 |  | 1 |
| **13** |  |  | 1 |  |  | 1 | 1 |  |  | 1 | 1 |  | **1** |  |  | 1 |  | 1 |  |  |  | 1 |  |  | 1 |
| **14** |  |  |  |  |  |  | 1 |  |  |  |  |  |  | **1** |  |  |  |  |  |  |  |  |  |  | 1 |
| **15** |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  | **1** |  |  |  |  |  |  |  |  |  | 1 |
| **16** |  | 1 | 1 |  | 1 | 1 |  |  | 1 | 1 |  |  | 1 |  |  | **1** |  |  | 1 |  |  |  | 1 |  |  |
| **17** |  |  | 1 |  |  | 1 |  |  |  | 1 |  |  |  |  |  |  | **1** | 1 |  |  |  |  |  |  |  |
| **18** |  | 1 |  |  | 1 |  |  |  | 1 |  |  |  | 1 |  |  |  | 1 | **1** | 1 |  |  |  | 1 |  |  |
| **19** | 1 |  |  | 1 |  |  |  | 1 |  |  |  | 1 |  |  |  | 1 |  | 1 | **1** |  |  |  |  |  |  |
| **20** |  | 1 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **1** |  |  |  |  |  |
| **21** |  | 1 | 1 | 1 | 1 | 1 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  | **1** |  |  |  |  |
| **22** |  | 1 | 1 | 1 | 1 | 1 |  | 1 | 1 | 1 |  | 1 | 1 |  |  |  |  |  |  |  |  | **1** |  |  |  |
| **23** |  |  |  | 1 |  |  |  | 1 |  |  |  | 1 |  |  |  | 1 |  | 1 |  |  |  |  | **1** |  |  |
| **24** |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **1** |  |
| **25** |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | 1 | 1 |  |  |  |  |  |  |  |  |  | **1** |

**Построение семейства Ψ**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ψ** |  | **M** | | | | | | | | | |
| **1** |  | 1 | 2 | 3 | 6 | 7 | 23 | 24 | 25 |  |  |
| **2** |  | 1 | 2 | 5 | 6 | 7 | 23 | 24 | 25 |  |  |
| **3** |  | 1 | 3 | 6 | 7 | 18 | 24 | 25 |  |  |  |
| **4** |  | 1 | 5 | 6 | 7 | 20 | 23 | 24 | 25 |  |  |
| **5** |  | 1 | 5 | 7 | 17 | 20 | 23 | 24 | 25 |  |  |
| **6** |  | 1 | 5 | 9 | 10 | 11 | 14 | 15 | 20 | 23 | 24 |
| **7** |  | 1 | 6 | 7 | 18 | 20 | 24 | 25 |  |  |  |
| **8** |  | 1 | 6 | 10 | 11 | 14 | 15 | 18 | 20 | 24 |  |
| **9** |  | 1 | 7 | 16 | 17 | 20 | 22 | 24 | 25 |  |  |
| **10** |  | 1 | 7 | 17 | 20 | 22 | 23 | 24 | 25 |  |  |
| **11** |  | 1 | 8 | 9 | 10 | 11 | 14 | 15 | 20 | 21 | 24 |
| **12** |  | 1 | 8 | 10 | 11 | 14 | 15 | 18 | 20 | 21 | 24 |
| **13** |  | 1 | 8 | 11 | 14 | 15 | 16 | 17 | 20 | 21 | 24 |
| **14** |  | 1 | 8 | 12 | 13 | 14 | 15 | 17 | 20 | 21 | 24 |
| **15** |  | 1 | 9 | 10 | 11 | 14 | 15 | 20 | 21 | 23 | 24 |
| **16** |  | 1 | 9 | 11 | 14 | 15 | 17 | 20 | 21 | 23 | 24 |
| **17** |  | 1 | 9 | 13 | 14 | 15 | 17 | 20 | 21 | 23 | 24 |
| **18** |  | 1 | 11 | 14 | 15 | 16 | 17 | 20 | 21 | 22 | 24 |
| **19** |  | 1 | 11 | 16 | 17 | 20 | 21 | 22 | 24 | 25 |  |
| **20** |  | 1 | 11 | 17 | 20 | 21 | 22 | 23 | 24 | 25 |  |
| **21** |  | 2 | 3 | 6 | 7 | 19 | 23 | 24 | 25 |  |  |
| **22** |  | 2 | 5 | 6 | 7 | 19 | 23 | 24 | 25 |  |  |
| **23** |  | 2 | 5 | 7 | 17 | 19 | 23 | 24 | 25 |  |  |
| **24** |  | 2 | 5 | 9 | 10 | 11 | 14 | 15 | 19 | 23 | 24 |
| **25** |  | 4 | 5 | 6 | 7 | 20 | 25 |  |  |  |  |
| **26** |  | 4 | 5 | 7 | 17 | 20 | 25 |  |  |  |  |
| **27** |  | 4 | 5 | 9 | 10 | 11 | 14 | 15 | 20 |  |  |
| **28** |  | 4 | 6 | 7 | 18 | 20 | 25 |  |  |  |  |
| **29** |  | 4 | 6 | 10 | 11 | 14 | 15 | 18 | 20 |  |  |
| **30** |  | 4 | 7 | 16 | 17 | 20 | 25 |  |  |  |  |
| **31** |  | 4 | 8 | 9 | 10 | 11 | 14 | 15 | 20 |  |  |
| **32** |  | 4 | 8 | 10 | 11 | 14 | 15 | 18 | 20 |  |  |
| **33** |  | 4 | 8 | 11 | 14 | 15 | 16 | 17 | 20 |  |  |
| **34** |  | 4 | 8 | 12 | 13 | 14 | 15 | 17 | 20 |  |  |
| **35** |  | 5 | 6 | 7 | 19 | 20 | 23 | 24 | 25 |  |  |
| **36** |  | 5 | 6 | 10 | 11 | 14 | 15 | 19 | 20 | 23 | 24 |
| **37** |  | 5 | 7 | 17 | 19 | 20 | 23 | 24 | 25 |  |  |
| **38** |  | 5 | 9 | 10 | 11 | 14 | 15 | 19 | 20 | 23 | 24 |
| **39** |  | 5 | 9 | 11 | 14 | 15 | 17 | 19 | 20 | 23 | 24 |
| **40** |  | 5 | 9 | 13 | 14 | 15 | 17 | 19 | 20 | 23 | 24 |
| **41** |  | 7 | 17 | 19 | 20 | 22 | 23 | 24 | 25 |  |  |
| **42** |  | 9 | 10 | 11 | 14 | 15 | 19 | 20 | 21 | 23 | 24 |
| **43** |  | 9 | 11 | 14 | 15 | 17 | 19 | 20 | 21 | 23 | 24 |
| **44** |  | 9 | 11 | 17 | 19 | 20 | 21 | 23 | 24 | 25 |  |
| **45** |  | 9 | 13 | 14 | 15 | 17 | 19 | 20 | 21 | 23 | 24 |
| **46** |  | 11 | 17 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | 17 | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** | **31** | **32** | **33** | **34** | **35** | **36** | **37** | **38** | **39** | **40** | **41** | **42** | **43** | **44** | **45** | **46** |
| **1** | **0** | 9 | 9 | 10 | 11 | 15 | 10 | 14 | 12 | 11 | 16 | 16 | 16 | 16 | 15 | 15 | 15 | 16 | 14 | 13 | 9 | 10 | 11 | 15 | 11 | 12 | 16 | 11 | 15 | 12 | 16 | 16 | 16 | 16 | 11 | 15 | 12 | 16 | 16 | 16 | 12 | 16 | 16 | 14 | 16 | 14 |
| **2** |  | **0** | 10 | 9 | 10 | 14 | 10 | 14 | 12 | 11 | 16 | 16 | 16 | 16 | 15 | 15 | 15 | 16 | 14 | 13 | 10 | 9 | 10 | 14 | 10 | 11 | 15 | 11 | 15 | 12 | 16 | 16 | 16 | 16 | 10 | 14 | 11 | 15 | 15 | 15 | 12 | 16 | 16 | 14 | 16 | 14 |
| **3** |  |  | **0** | 10 | 11 | 15 | 8 | 12 | 11 | 11 | 15 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 13 | 13 | 10 | 11 | 12 | 16 | 10 | 11 | 15 | 9 | 13 | 11 | 15 | 14 | 15 | 15 | 11 | 15 | 12 | 16 | 16 | 16 | 12 | 16 | 16 | 14 | 16 | 14 |
| **4** |  |  |  | **0** | 9 | 13 | 9 | 13 | 11 | 10 | 15 | 15 | 15 | 15 | 14 | 14 | 14 | 15 | 13 | 12 | 11 | 10 | 11 | 15 | 9 | 10 | 14 | 10 | 14 | 11 | 15 | 15 | 15 | 15 | 9 | 13 | 10 | 14 | 14 | 14 | 11 | 15 | 15 | 13 | 15 | 13 |
| **5** |  |  |  |  | **0** | 13 | 10 | 14 | 10 | 9 | 15 | 15 | 14 | 14 | 14 | 13 | 13 | 14 | 12 | 11 | 12 | 11 | 10 | 15 | 10 | 9 | 14 | 11 | 15 | 10 | 15 | 15 | 14 | 14 | 10 | 14 | 9 | 14 | 13 | 13 | 10 | 15 | 14 | 12 | 14 | 12 |
| **6** |  |  |  |  |  | **0** | 14 | 12 | 15 | 14 | 12 | 13 | 14 | 15 | 11 | 12 | 13 | 14 | 15 | 14 | 16 | 15 | 15 | 12 | 14 | 14 | 11 | 15 | 13 | 15 | 12 | 13 | 14 | 15 | 14 | 12 | 14 | 11 | 12 | 13 | 15 | 12 | 13 | 14 | 14 | 15 |
| **7** |  |  |  |  |  |  | **0** | 11 | 10 | 10 | 14 | 13 | 14 | 14 | 14 | 14 | 14 | 14 | 12 | 12 | 11 | 11 | 12 | 16 | 9 | 10 | 14 | 8 | 12 | 10 | 14 | 13 | 14 | 14 | 10 | 14 | 11 | 15 | 15 | 15 | 11 | 15 | 15 | 13 | 15 | 13 |
| **8** |  |  |  |  |  |  |  | **0** | 14 | 14 | 12 | 11 | 13 | 14 | 12 | 13 | 14 | 13 | 14 | 14 | 15 | 15 | 16 | 14 | 13 | 14 | 12 | 12 | 10 | 14 | 12 | 11 | 13 | 14 | 14 | 12 | 15 | 13 | 14 | 15 | 15 | 13 | 14 | 15 | 15 | 15 |
| **9** |  |  |  |  |  |  |  |  | **0** | 9 | 15 | 15 | 13 | 14 | 15 | 14 | 14 | 12 | 10 | 11 | 13 | 13 | 12 | 17 | 11 | 10 | 15 | 11 | 15 | 9 | 15 | 15 | 13 | 14 | 12 | 16 | 11 | 16 | 15 | 15 | 10 | 16 | 15 | 13 | 15 | 12 |
| **10** |  |  |  |  |  |  |  |  |  | **0** | 15 | 15 | 14 | 14 | 14 | 13 | 13 | 13 | 11 | 10 | 12 | 12 | 11 | 16 | 11 | 10 | 15 | 11 | 15 | 10 | 15 | 15 | 14 | 14 | 11 | 15 | 10 | 15 | 14 | 14 | 9 | 15 | 14 | 12 | 14 | 11 |
| **11** |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 12 | 13 | 11 | 12 | 13 | 13 | 14 | 14 | 17 | 17 | 17 | 14 | 15 | 15 | 12 | 15 | 13 | 15 | 11 | 12 | 13 | 14 | 16 | 14 | 16 | 13 | 14 | 15 | 16 | 12 | 13 | 14 | 14 | 15 |
| **12** |  |  |  |  |  |  |  |  |  |  |  | **0** | 12 | 13 | 12 | 13 | 14 | 13 | 14 | 14 | 17 | 17 | 17 | 15 | 15 | 15 | 13 | 14 | 12 | 15 | 12 | 11 | 13 | 14 | 16 | 14 | 16 | 14 | 15 | 16 | 16 | 13 | 14 | 15 | 15 | 15 |
| **13** |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 12 | 13 | 12 | 13 | 11 | 12 | 13 | 17 | 17 | 16 | 16 | 15 | 14 | 14 | 15 | 14 | 13 | 13 | 13 | 11 | 13 | 16 | 15 | 15 | 15 | 14 | 15 | 15 | 14 | 13 | 14 | 14 | 14 |
| **14** |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 14 | 13 | 12 | 13 | 14 | 14 | 17 | 17 | 16 | 17 | 15 | 14 | 15 | 15 | 15 | 14 | 14 | 14 | 13 | 11 | 16 | 16 | 15 | 16 | 15 | 14 | 15 | 15 | 14 | 15 | 13 | 15 |
| **15** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 12 | 13 | 14 | 13 | 16 | 16 | 16 | 13 | 15 | 15 | 12 | 15 | 13 | 15 | 12 | 13 | 14 | 15 | 15 | 13 | 15 | 12 | 13 | 14 | 15 | 11 | 12 | 13 | 13 | 14 |
| **16** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 12 | 13 | 12 | 16 | 16 | 15 | 14 | 15 | 14 | 13 | 15 | 14 | 14 | 13 | 14 | 13 | 14 | 15 | 14 | 14 | 13 | 12 | 13 | 14 | 12 | 11 | 12 | 12 | 13 |
| 17 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 13 | 14 | 13 | 16 | 16 | 15 | 15 | 15 | 14 | 14 | 15 | 15 | 14 | 14 | 15 | 14 | 13 | 15 | 15 | 14 | 14 | 13 | 12 | 14 | 13 | 12 | 13 | 11 | 14 |
| **18** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 12 | 17 | 17 | 16 | 16 | 15 | 14 | 14 | 15 | 14 | 13 | 14 | 14 | 12 | 14 | 16 | 15 | 15 | 15 | 14 | 15 | 14 | 14 | 13 | 14 | 14 | 13 |
| **19** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 10 | 15 | 15 | 14 | 17 | 13 | 12 | 15 | 13 | 15 | 11 | 15 | 15 | 13 | 15 | 14 | 16 | 13 | 16 | 15 | 16 | 12 | 15 | 14 | 12 | 15 | 11 |
| **20** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 14 | 14 | 13 | 16 | 13 | 12 | 15 | 13 | 15 | 12 | 15 | 15 | 14 | 15 | 13 | 15 | 12 | 15 | 14 | 15 | 11 | 14 | 13 | 11 | 14 | 10 |
| **21** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 9 | 10 | 14 | 11 | 12 | 16 | 11 | 15 | 12 | 16 | 16 | 16 | 16 | 10 | 14 | 11 | 15 | 15 | 15 | 11 | 15 | 15 | 13 | 15 | 13 |
| **22** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 9 | 13 | 10 | 11 | 15 | 11 | 15 | 12 | 16 | 16 | 16 | 16 | 9 | 13 | 10 | 14 | 14 | 14 | 11 | 15 | 15 | 13 | 15 | 13 |
| **23** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 13 | 11 | 10 | 15 | 12 | 16 | 11 | 16 | 16 | 15 | 15 | 10 | 14 | 9 | 14 | 13 | 13 | 10 | 15 | 14 | 12 | 14 | 12 |
| **24** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 15 | 15 | 12 | 16 | 14 | 16 | 13 | 14 | 15 | 16 | 14 | 12 | 14 | 11 | 12 | 13 | 15 | 12 | 13 | 14 | 14 | 15 |
| **25** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 7 | 11 | 7 | 11 | 8 | 12 | 12 | 12 | 12 | 9 | 13 | 10 | 14 | 14 | 14 | 11 | 15 | 15 | 13 | 15 | 13 |
| **26** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 8 | 12 | 7 | 12 | 12 | 11 | 11 | 10 | 14 | 9 | 14 | 13 | 13 | 10 | 15 | 14 | 12 | 14 | 12 |
| **27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 12 | 10 | 12 | 9 | 10 | 11 | 12 | 14 | 12 | 14 | 11 | 12 | 13 | 15 | 12 | 13 | 14 | 14 | 15 |
| **28** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 10 | 8 | 12 | 11 | 12 | 12 | 10 | 14 | 11 | 15 | 15 | 15 | 11 | 15 | 15 | 13 | 15 | 13 |
| **29** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 12 | 10 | 9 | 11 | 12 | 14 | 12 | 15 | 13 | 14 | 15 | 15 | 13 | 14 | 15 | 15 | 15 |
| **30** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 12 | 12 | 10 | 11 | 11 | 15 | 10 | 15 | 14 | 14 | 10 | 15 | 14 | 12 | 14 | 12 |
| **31** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 9 | 10 | 11 | 15 | 13 | 15 | 12 | 13 | 14 | 15 | 12 | 13 | 14 | 14 | 15 |
| **32** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 10 | 11 | 15 | 13 | 15 | 13 | 14 | 15 | 15 | 13 | 14 | 15 | 15 | 15 |
| **33** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 10 | 15 | 14 | 14 | 14 | 13 | 14 | 14 | 14 | 13 | 14 | 14 | 14 |
| **34** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 15 | 15 | 14 | 15 | 14 | 13 | 14 | 15 | 14 | 15 | 13 | 15 |
| **35** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 12 | 9 | 13 | 13 | 13 | 10 | 14 | 14 | 12 | 14 | 12 |
| **36** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 13 | 11 | 12 | 13 | 14 | 12 | 13 | 14 | 14 | 14 |
| **37** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 13 | 12 | 12 | 9 | 14 | 13 | 11 | 13 | 11 |
| **38** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 12 | 14 | 11 | 12 | 13 | 13 | 14 |
| **39** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 13 | 12 | 11 | 12 | 12 | 13 |
| **40** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 13 | 13 | 12 | 13 | 11 | 14 |
| **41** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 14 | 13 | 11 | 13 | 10 |
| **42** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 12 | 12 | 13 |
| **43** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 11 | 11 | 12 |
| **44** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 12 | 10 |
| **45** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** | 13 |
| **46** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **0** |

Максимальное значение критерия, равное 17, у Ψ:

9-24, 11-21, 11-22, 11-23, 12-21, 12-22, 12-23, 13-21, 13-22, 14-21, 14-22, 14-24, 18-21, 18-22, 19-21

Перебирая значения, размещение в два слоя удается выполнить сΨ19 и Ψ24.

Уберем из всех Ψ ребра, которые будут в первом слое (входят в Ψ19 и Ψ24)

Ψ1 – 3, 6, 7

Ψ2 – 6, 7

Ψ3 – 3, 6, 7, 18

Ψ4 – 6, 7

Ψ5 – 7

Ψ7 – 6, 7, 18

Ψ8 – 6

Ψ9 – 7

Ψ10 – 7

Ψ11 – 8

Ψ12 – 8

Ψ13 – 8

Ψ14 – 8, 12, 13

Ψ17 – 13

Ψ21 – 3, 6, 7

Ψ22 – 6, 7

Ψ23 – 7

Ψ25 – 4, 6, 7

Ψ26 – 4, 7

Ψ27 – 4

Ψ28 – 4, 6, 7, 18

Ψ29 – 4, 6

Ψ30 – 4, 7

Ψ31 – 4, 8

Ψ32 – 4, 8

Ψ33 – 4, 8

Ψ34 – 4, 8, 12, 13

Ψ35 – 6, 7

Ψ36 – 6

Ψ37 – 7

Ψ40 – 13

Ψ41 – 7

Ψ45 – 13

После поглощения

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| M | | | |  | Ψ |
| 3 | 6 | 7 | 18 |  | **1** |
| 4 | 8 | 18 |  |  | **2** |
| 4 | 8 | 12 | 13 |  | **3** |
| 4 | 6 | 7 | 18 |  | **4** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **1** | **2** | **3** | **4** |
| **1** | 0 | 6 | 8 | 5 |
| **2** |  | 0 | 5 | 5 |
| **3** |  |  | 0 | 7 |
| **4** |  |  |  | 0 |

Максимальный критерий у Ψ1’ – Ψ3’

**Изоморфизм графов**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | | | | | | | | | | | | | |
|  | **e1** | **e2** | **e3** | **e4** | **e5** | **e6** | **e7** | **e8** | **e9** | **e10** | **e11** | **e12** |  |
| **e1** | **0** | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | **7** |
| **e2** | 1 | **0** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | **4** |
| **e3** | 1 | 0 | **0** | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | **4** |
| **e4** | 1 | 0 | 0 | **0** | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | **8** |
| **e5** | 1 | 0 | 1 | 1 | **0** | 1 | 0 | 1 | 1 | 1 | 0 | 0 | **7** |
| **e6** | 0 | 1 | 0 | 0 | 1 | **0** | 0 | 0 | 0 | 0 | 0 | 1 | **3** |
| **e7** | 0 | 0 | 0 | 1 | 0 | 0 | **0** | 1 | 0 | 1 | 1 | 1 | **5** |
| **e8** | 0 | 0 | 0 | 1 | 1 | 0 | 1 | **0** | 0 | 0 | 1 | 1 | **5** |
| **e9** | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | **0** | 1 | 1 | 1 | **6** |
| **e10** | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | **0** | 1 | 1 | **9** |
| **e11** | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | **0** | 1 | **7** |
| **e12** | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | **0** | **9** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y | | | | | | | | | | | | | |
|  | **e1** | **e2** | **e3** | **e4** | **e5** | **e6** | **e7** | **e8** | **e9** | **e10** | **e11** | **e12** |  |
| **e1** | **0** | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | **7** |
| **e2** | 0 | **0** | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | **5** |
| **e3** | 1 | 0 | **0** | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | **4** |
| **e4** | 1 | 1 | 0 | **0** | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | **8** |
| **e5** | 1 | 1 | 0 | 1 | **0** | 1 | 1 | 1 | 1 | 1 | 1 | 0 | **9** |
| **e6** | 0 | 0 | 0 | 0 | 1 | **0** | 1 | 0 | 0 | 0 | 0 | 1 | **3** |
| **e7** | 1 | 0 | 0 | 0 | 1 | 1 | **0** | 0 | 0 | 1 | 0 | 0 | **4** |
| **e8** | 0 | 1 | 0 | 1 | 1 | 0 | 0 | **0** | 0 | 0 | 1 | 1 | **5** |
| **e9** | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | **0** | 1 | 1 | 1 | **6** |
| **e10** | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | **0** | 1 | 1 | **9** |
| **e11** | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | **0** | 0 | **7** |
| **e12** | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | **0** | **7** |

|  |  |  |  |
| --- | --- | --- | --- |
| Инвариант | X | Y | Совпадение |
| m | 12 | 12 | + |
| k | 74 | 74 | + |
| p | 1 | 1 | + |
| Список степеней вершин | 9, 9, 8, 7, 7, 7, 6, 5, 5, 4, 4, 3 | 9, 9, 8, 7, 7, 7, 6, 5, 5, 4, 4, 3 | + |

Разобьем вершины на классы по их степеням:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | X | | |  | Y | | |
| **9** | 10 | 12 |  | 5 | 10 |  |
| **8** | 4 |  |  | 4 |  |  |
| **7** | 1 | 5 | 11 | 1 | 11 | 12 |
| **6** | 9 |  |  | 9 |  |  |
| **5** | 7 | 8 |  | 2 | 8 |  |
| **4** | 2 | 3 |  | 3 | 7 |  |
| **3** | 6 |  |  | 6 |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 |  | 4 |  |  | 1 |  | 4 |  |  | 2 |  | 4 |  |  | 3 |  | 4 |
| 5 |  |  |  |  | 11 |  |  |  |  | 3 |  | 9 |  |  | 7 |  | 9 |
| 11 |  | 6 |  |  | 12 |  | 6 |  |  |  |  | 6 |  |  |  |  | 6 |
|  | Соответствие 12-5 | | | | |  |  |  |  |  | Соответсвтие 2-7 | | | | |  |  |

Графы X и Y изоморфны. Соответствие вершин:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Y | 1 | 7 | 3 | 4 | 12 | 6 | 2 | 8 | 9 | 10 | 11 | 5 |

**Нахождение эйлерова цикла**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **e1** | **e2** | **e3** | **e4** | **e5** | **e6** | **e7** | **e8** | **e9** | **e10** | **e11** | **e12** |
| **e1** | **0** | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | **8** |
| **e2** | 1 | **0** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | **4** |
| **e3** | 1 | 0 | **0** | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | **4** |
| **e4** | 1 | 0 | 0 | **0** | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | **8** |
| **e5** | 1 | 0 | 1 | 1 | **0** | 1 | 0 | 1 | 1 | 1 | 0 | 1 | **8** |
| **e6** | 0 | 1 | 0 | 0 | 1 | **0** | 0 | 0 | 0 | 0 | 1 | 1 | **4** |
| **e7** | 0 | 0 | 0 | 1 | 0 | 0 | **0** | 1 | 0 | 0 | 1 | 1 | **4** |
| **e8** | 1 | 0 | 0 | 1 | 1 | 0 | 1 | **0** | 0 | 0 | 1 | 1 | **6** |
| **e9** | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | **0** | 1 | 1 | 1 | **6** |
| **e10** | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | **0** | 1 | 1 | **8** |
| **e11** | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | **0** | 1 | **8** |
| **e12** | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **0** | **10** |

12 - 1 - 3 - 5 - 4 - 1 - 2 - 6 - 5 - 1 - 8 - 4 - 9 - 3 - 10 - 1 - 11 - 4 - 10 - 2 - 12 - 4 - 7 - 8 - 5 - 9 - 10 - 5 - 12 - 6 - 11 - 7 - 12 - 8 - 11 - 9 - 12 - 10 - 11 - 12