CISP 440

Austin Smothers

Homework 5

# Section 2.4

1. **R** = {(a, 3), (b, 1), (b, 4), (c, 1)}

|  |  |
| --- | --- |
| Roger | Music |
| Pat | History |
| Pat | PolySci |
| Ben | Math |

1 2

3 4

1. **R** = {(1,1), (2,2), (3,3), (3,5), (4,3), (4,4), (5,4), (5,5)}
2. (3) Inverse:

|  |  |
| --- | --- |
| Math | Sally |
| Physics | Ruth |
| Econ | Sam |

1. R = (1, 2, 3, 4, 5) for (x,y) if x + y <= 6

RNew = {(1,1), (1,2), (1,3), (1,4), (1,5), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3),

(4,1), (4,2), (5,1)}

**RNew is not Reflexive [lacking (4,4) & (5,5)]**

**RNew is Symmetric**

**RNew is not Anti-Symmetric because it is Symmetric**

**RNew is not Transitive [lacking (2,5), (3,4), (3,5), (4,3), (4,4), (4,5)… etc]**

**RNew is not a Partial Order [ !(Reflexive, Anti-Symmetric, and Transitive)]**

1. (x,y) within R if 3 divides x – y

R = {(1,1), (2,2), (3,3), (4,1), (4,4), (5,2), (5,5)… etc}

**R is Reflexive**

**R is not Symetric**

**R is Anti-Symmetric**

**R is Transitive**

**R is a Partial Order**

1. **R** = {(1,1), (1,3), (2,2), (3,3), (4,1), (4,4)}

# Section 2.5

1. R = (1,2,3,4,5)

RNew = {(1,1), (2,2), (3,3), (4,4), (5,5), (1,3), (3,1), (3,4), (4,3)}

**RNew is Reflexive**

**RNew is Symmetric**

**RNew is not Transitive [(4,3) n (3,1) = (4,1) is not in set]**

**RNew is not an Equivalence Relation [not Transitive]**

1. RNew = {(x,y) | 4 divides x – y}= {(1,1), (2,2), (3,3), (4,4), (5,1), (5,5)}

**RNew is not Equivalence Relation [not Symmetric]**

1. RNew = {(x,y) | x divides 2 – y} = {(1,1), (1,2), (2,2), (3,2), (4,2), (5,2)}

**RNew is not an Equivalence Relation [not Symmetric nor Reflexive]**

1. R is Reflexive, R is Symmetric, R is not Transitive

**R is not an Equivalence Relation on the set of all people**

1. R is Reflexive, R is Symmetric, R is Transitive (assuming hair doesn’t change color)

**R is an Equivalence Relation on the set of all people**

1. {[1], [2], [3], [4]}

**R = {(1,1), (2,2), (3,3), (4,4)}**

**[1] = {1} [2] = {2} [3] = {3} [4] = {4}**

1. {[1], [2,4], [3]}

**R = {(1,1), (2,2), (2,4), (3,3), (4,2), (4,4)}**

**[1] = {1} [2] = [4] = {2, 4} [3] = {3}**

1. R = {(1,1), (1,2), (1,5), (2,1), (2,2), (2,5), (5,1), (5,2), (5,5)}

**R is Reflexive, Symmetric, and Transitive, therefore it is an Equivalence Relation**

1. **R = {(1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4),**

**(3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4)}**

1. **Nine**

# Section 2.6

1. R = {(x,a), (x,c), (y,a), (y,b), (z,d)}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | a | b | c | d |
| x | 1 | 0 | 1 | 0 |
| y | 1 | 1 | 0 | 0 |
| z | 0 | 0 | 0 | 1 |

1. R = {(1,2), (2,3), (3,4), (4,5)}

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| 5 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 0 | 0 |
| 2 | 0 | 0 | 1 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 1 |

1. **R = {(1,1), (1,3), (2,2), (2,3), (2,4)}**
2. **Matrix is Transitive**