CSCI 1900 - Homework 14 - B

**Section 9.1, 9.2, 9.3: Relations** *(59)*

1. Determine *x* and *y* such that the equations below are true. (3)
	1. (13, *y*2) = ( 2*x*-1, 16)
	2. (CSCI\_1900, CSCI\_1260) = ( *y*, *x* )
	3. ( *x*, *y* ) = ( *x*2, *y*2 )
2. Given sets A={ 1, 2 } B={ @, #, \* } (2)
	1. Give A x B
	2. Give A x A
3. Given the set $C=R$, the set of real numbers and a relation *R* define on *C* such that

*x R y* iff $x^{2}+ y^{2}=4$

The set *R* contains all points on a circle of radius 2, with the center at (0.0, 0.0 ). Which of the following ordered pairs belong to *R*?

* 1. ( 0.0, 0.0 ) (1)
	2. ( 2.0, 0.0 ) (1)
	3. $\left( 2.0, 2.0 \right)$ (1)
	4. (0.0, -2.0) (1)
	5. $\left(1.0, \sqrt{3.0} \right)$ (1)
	6. $\left(\sqrt{2.0}, \sqrt{2.0}\right)$ (1)

For problems 4-8 give the domain, range and matrix. If the relation is to and from the same set, draw the diagraph.

1. $D= \left\{ d, e, f, g \right\}$ $E= \left\{ α, β, γ \right\}$ $R= \left\{\left(d, α\right), \left(e, γ\right), \left(f, α\right), \left(g, γ\right)\right\} $(4)
2. $F= \left\{ 0, 1, 2, 3 \right\}$ $G= \left\{ 0, 1, 2, 3, 4, 5, 6\right\}$ $ f R g iff g=f +2$ (4)
3. $H= \left\{ 0, 1, 2, 3, 4, 5, 6 \right\}$ $I= \left\{ 0, 1, 2, 3, 4, 5, 6\right\}$ $ h R i iff i=h mod 3$ (4)
4. $J= \left\{ 0, 1, 2, 3, 4, 5, 6 \right\}$ $K= J$ $j R k iff k>j$ (4)
5. $L= \left\{ 0, 1, 2, 3, 4, 5, 6 \right\}$ $M= L$ $l R m iff \left|l-m\right|<2$ (4)
6. $N=O= R$ $ o R n iff o+n=5.0 $(4)

For problems 10 – 13, determine if the given relations are reflexive, irreflexive, symmetric, asymmetric, or transitive. The relations are defined on $P= \left\{0, 1, 2, 3\right\}$

1. $R= \left\{ \left(0, 0\right), \left(0, 1\right), \left(0, 3\right), \left(1, 0\right), \left(1, 1\right), \left(2, 2\right), \left(3, 0\right), \left(3, 3\right) \right\}$ (5)
2. $S= \left\{ \left(0, 0\right), \left(0, 2\right), \left(0, 3\right), \left(2, 3\right) \right\}$ (5)
3. $T= \left\{ \left(0, 1\right), \left(2, 3\right), \left(3, 2\right) \right\}$ (5)
4. $A= Z^{+} B=A a R b iff$ *a* and *b* are relatively prime (5)

For problems 14 – 16, determine if the given relations are equivalence relations. The relations in problems 14 – 16 are defined on $P= \left\{0, 1, 2, 3\right\}$

1. $R= \left\{ \left(0, 0\right) \right\}$ (1)
2. $R= \left\{ \left(0, 0\right), \left(0, 1\right), \left(1,0\right), \left(1, 1\right), \left(2, 2\right) \right\}$ (1)
3. $R= \left\{ \left(0, 0\right), \left(0, 1\right), \left(0, 2\right), \left(1, 0\right), \left(1, 1\right), \left(1, 2\right), \left(2, 0\right), \left(2, 2\right) \right\}$ (1)
4. Let the set a be the set of all students enrolled in ETSU in the Spring 2012 semester; a relation *R* exists only if two students have the same last name. (1)