5.1.1(a)

A picture containing shape

Description automatically generated

5.1.4(a)

1 1 1

0 0 0

0 0 0

5.2.1(b)

anti-reflexive – xLx is not true, x < x is not true

anti-symmetric – xLy and yLx are never both true, if x < y then y < x is not true

transitive – if xLy and yLz then xLz, if x < y and y < z then x < z

5.2.4(b)

anti-reflexive

anti-symmetric

transitive

5.3.1(a)

2

5.3.4(d)

⟨1, 2, 3, 1⟩, is a circuit of length one in which no vertex occurs more than once, except the first and last vertex which are the same

5.4.1(c)

{(a,a),(a,d),(c,b),(c,c)}

5.4.3(a)

A picture containing diagram

Description automatically generated

5.5.1(a)

no

5.5.1(c)

no

5.5.4(a)

no

5.5.4(c)

yes

5.5.4(e)

yes

5.6.3(a)

2, 4, 5

5.6.3(d)

yes

5.7.1(a)

j, I, A, F

5.8.1(a)

strict order, it is transitive – if word x comes before word y and word y comes before word z, then word x comes before word z, it is anti-symmetric – if word x comes before word y then word y cannot come before word x

5.8.2(a)

(b,f,c,d,e,a,g)

(b,d,c,f,e,a,g)

5.9.1(b)

yes, it is reflexive – xMx, x has the same mother as x, it is symmetric – xMy and yMx, if x has the same mother as y then y has the same mother as x, transitive – xMy and yMz then xMz, if x has the same mother as y and y has the same mother as z then x and z have the same mother.

The partition can be described by that each class is an individual that is distinct form the rest but shares a mother with the rest, therefore when combined with the other classes forms the “group of people” that is the domain.

5.9.2(a)

{7,31,99}, {2,34}, {13,17}, {4,44,56}

5.9.5(b)

No, it is not reflexive – x = 1, y = 2, m = 1

1 + 2 = 3 however x + x ≠ 3m, 1 + 1 ≠ 3 \* 1

2 ≠ 3