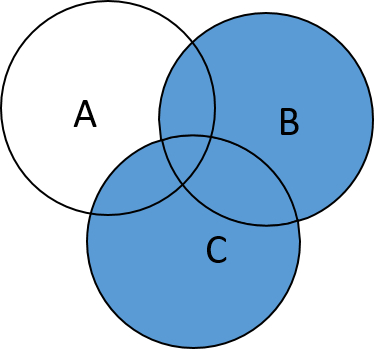
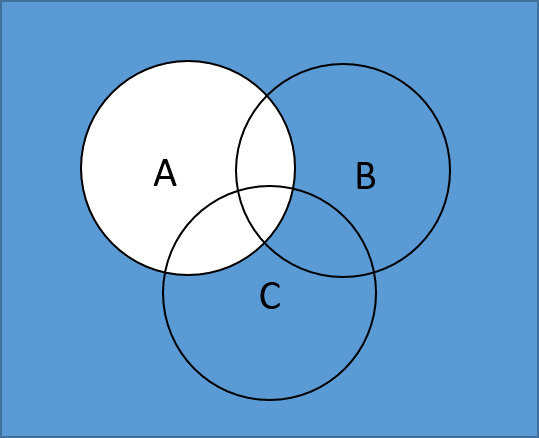
**6.1**

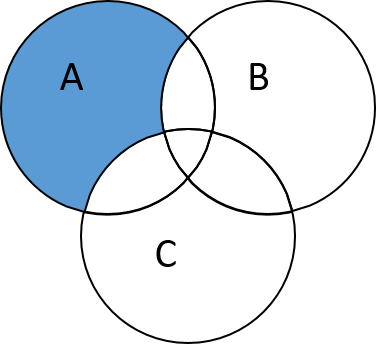
**17b.** B ∪ C



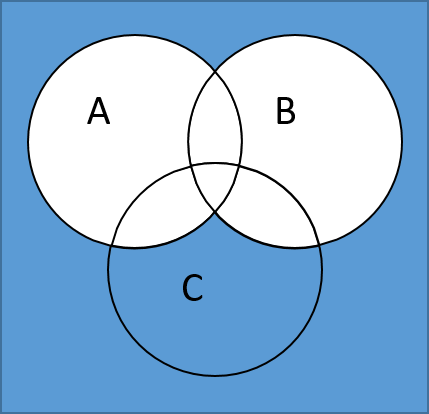
**17c.** Ac



**17d.** A – (B ∪ C)



**17e.** (A ∪ B)c



**17f.** Ac ∩ Bc is the same diagram as 17e.

**23.**

**a.** , because all the elements in every interval are in

**b.** , because ⊆ ⊆ ⊆

**c.** No because every Vk-1 ⊆ Vk

**d.** , because all the elements in every interval are in

**e.** , because ⊆ ⊆ ⊆ … ⊆

**f.** , because all the elements in every interval are in

**g.** {0}, because the only element in every interval is 0

**6.2**

**10. Proof:**

Suppose A, B, C are any sets. To show that (A − B) ∩ (C − B) = (A ∩ C) – B, we must show that

(A − B) ∩ (C − B) ⊆ (A ∩ C) – B and that (A ∩ C) – B ⊆ (A − B) ∩ (C − B).

**(A − B) ∩ (C − B) ⊆ (A ∩ C) – B:** Suppose that x is any element in (A − B) ∩ (C − B). *[We must show that x ∈ (A ∩ C) – B.]* By definition of intersection, x ∈ (A − B) and x ∈ (C − B).

Then, by definition of set difference, x ∈ A, x ∈ C and x ∉ B. By definition of intersection x ∈ A ∩ C and x ∉ B and so, by definition of set difference, x ∈ (A ∩ C) – B. So, (A − B) ∩ (C − B) ⊆ (A ∩ C) – B.

**(A ∩ C) – B ⊆ (A − B) ∩ (C − B):** Suppose that x is any element in (A ∩ C) – B. *[We must show that x ∈ (A − B) ∩ (C − B).]* By definition of set difference x ∈ (A ∩ C) and x ∉ B. By definition of intersection x ∈ A and x ∈ C. And so by definition of set difference x ∈ (A − B) and x ∈ (C − B). By definition of intersection x ∈ (A − B) ∩ (C − B). So, (A ∩ C) – B ⊆ (A − B) ∩ (C − B).

**17. Proof:**

Suppose A, B, and C are any sets such that A ⊆ C and B ⊆ C. Suppose that x is any element of A ∪ B. Then by definition of union, x ∈ A or x ∈ B and by definition of subsets x ∈ C. Therefore A ∪ B ⊆ C.

**31. Proof:**

Let A and B be any sets such that B ⊆ AC. We must show that A ∩ B = ∅. Suppose not. That is suppose there is an element x in A ∩ B. By definition of intersection x ∈ A and x ∈ B. Then since B ⊆ AC, x ∈ AC by definition of subset. But from definition of complement x ∉ A. Thus x ∉ A and x ∈ A, which is a contradiction. So the supposition that there is an element x in A ∩ B is false, and thus A ∩ B = ∅.

**7.1**

**2a.** domain of , co-domain of

**b.**

**c.** range of

**d.** No, Yes

**e.** inverse image of , inverse image of

**f.**

**7.2**

**9a.** X f Y **9b.** X g Z

1

2

1

2

3

1

2

3

4

1

2

3

**9c.** X h X X k X

1

2

3

1

2

3

1

2

3

1

2

3

**49.** **Proof:**

Let y ∈ **R**. *[We must show that* ∃*x in* **R** *such that g(x)*= *y.]* Let . Then x is a real number since sums and quotients of real numbers are real numbers. It follows that

Thus, *g* is onto.

**Proof:**

Suppose x1 and x2 are real numbers such that g(x1) = g(x2). *[We must show that x*1 = *x*2*.]* By definition of *g,*

Thus, g is one-to-one.

**Proof:**

For any y in **R**, by definition of , , such that ,

Hence,

**7.3**

**7.** (K ◦ H)(0)

(K ◦ H)(1)

(K ◦ H)(2)

(K ◦ H)(3)

**11.**

(H ◦ H-1)

Likewise, (H-1 ◦ H)

**8.1**

**7b.** Yes. . and because

**7c.** Yes. . and because

**7d.** Yes. . and because

**11.**  and

**14.**

B

D

A

C

**8.2**

**26.** R is reflexive. Suppose s is any string in A. Then s R s because the sum of s is equal to its on sum, and each element in s would then relate to itself.

R is symmetric. Suppose s and t are any strings in A such that s R t. By definition of R, s has the same sum as t, therefore t has the same sum as s, and so t R s.

R is transitive. Suppose, s, t, and u are any strings in A such that s R t, and t R u. By definition of R s has the same sum as t and t has the same sum as u. Therefore, s has the same sum as u, and so s R u.

**8.3**

**31.** R is reflexive. Suppose x is any point in P. Then x R x because any point would lie on the same half-line as itself.

R is symmetric. Suppose x and y are any points in P, such that x R y. By definition of R, x is on the same line as y, therefore y is on the same line as x, and so y R x.

R is transitive. Suppose x, y and z are any points in P, such that x R y and y R z. By definition of R, x is on the same line as y, and y is on the same line as z. Therefore, x is on the same line as z, and so x R z.

Thus, R is an equivalence relation because it satisfies all three properties. The equivalence class [a] would be any arbitrary point in P, and all elements x in the line between the origin and a would be related to a by R.

**46. Proof:**

We must show that R is reflexive for it to be an equivalence relation. Since R is symmetric, x R y, so y R x. Also since R is transitive x R x. Therefore R is reflexive since x R x.