

1. Ex:

A = { 1, 2 }

B = { 1, 2, 3 }

C = { 1, 2, 3, 4}

Proof:

Let x be an arbitrary and fixed element of A. Since A B, by definition of subsets x B. Since B C, by definition of subsets x C. Therefore, if x A, then x C. By definition of subsets A C.

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1. Ex:

A = {1, 2 }

B = { 1, 2, 3}

C = { 1, 2, 3, 4}

A is a subset of C.

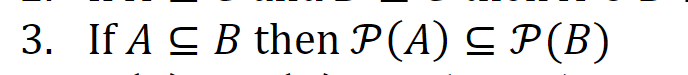
B is a subset of C.

Then by definition of subsets A B C.

Proof:

Let x be an arbitrary and fixed element of A B. By definition of union x A or x B. If x A, then by definition of subsets x C since A C . If x B, then by definition of subsets x C since B C. By definition of subset if x A, or x B, and x C, then A B C.

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Ex:

A = {1, 2}

P(A) = {{}, {1}, {2}, {1,2}}

B = {1, 2, 3}

P(B) = {{}, {1}, {2}, {3}, {1,2}, {2,3}, {1,3}, {1,2,3}}

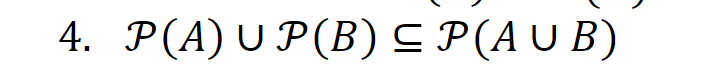
A B

Ƥ(A) Ƥ(B).

Proof:

Let X be an arbitrary and fixed element of Ƥ(A). By definition of power sets if X Ƥ(A) then X A. Since A B, by definition of subsets X B. By definition of power sets if X B, then X Ƥ(B). Therefore, if X Ƥ(A), and X Ƥ(B), then by definition of subsets Ƥ(A) Ƥ(B).

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A = {1}

B = {3}

Ƥ(A) = {, {1}}

Ƥ(B) = {, {3}}

Ƥ(A) Ƥ(B) ={, {3}, {1}}

A B = {1,3}

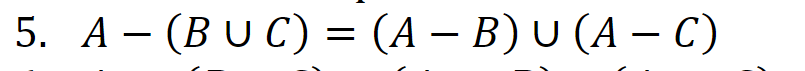
Ƥ(A B) = {{, {3}, {1}, {3,1}}

Ƥ(A) Ƥ(B) Ƥ(A B).

Proof:

Let X be an arbitrary and fixed element of Ƥ(A) Ƥ(B). By definition of union XƤ(A) or XƤ(B). By definition of power set X A or X B. By definition of union X A B. By definition of power sets, if X A B, then X Ƥ(A B). Therefore, if X Ƥ(A B) then by definition of subsets Ƥ(A) Ƥ(B) Ƥ(A B).

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Counter Ex:

A = {1,2,3}

B = {1,2}

C = {1}

B C = {1,2}

A – (B C) = {3}

(A-B) = {3}

(A-C)= {2,3}

(A-B) (A-C) = {2,3}

A – (B C) (A-B) (A-C).

A – (B C) (A-B) (A-C)

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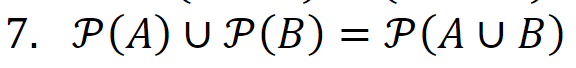
Proof:

Let (x,y) be an arbitrary and fixed element of A × (B C). By definition of cartesian product x A and y B C. By definition of union y B or y C. By definition of cartesian product we have that x A and y B or x A and y C. By definition of union, we can write this as (x A and y B) ( x A and y C). By definition of cartesian product we can rewrite this as (x,y) (A × B) (A × C). Thus A × (B C) ( A × B) ( A × C).

Let (x,y) be an arbitrary and fixed element of (A × B) (A × C). By definition of union (x,y) A × B or (x,y) A × C. By definition of cartesian product we have that x A and y B or x A and y C. By definition of union, we can write this as x A and y B C. By definition of cartesian product we can write this as (x,y) A × (B C).

Thus A × (B C) (A × B) ( A × C).

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Counter EX:

A = {1}

B = {3}

Ƥ(A) = {, {1}}

Ƥ(B) = {, {3}}

Ƥ(A) Ƥ(B) ={, {3}, {1}}

A B = {1,3}

Ƥ(A B) ={ , {3}, {1}, {3,1}}

Thus Ƥ(A) Ƥ(B) Ƥ(A B)

Ƥ(A) Ƥ(B) Ƥ(A B).

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