1. The power set of S is { {, {1}, {2}, {1, 2} } with being the empty set.
2. **Yes, they are equal:**

A = {1, 2}, B = {2, 1} Given.

(1 A) (1 B) 1 exists in A and B

(2 A) (2 B) 2 exists in A and B

(A B) (B A) A is a subset of B and B is a subset of A

A = B Conclusion

1. and { } are not the same set. represents the empty set, while { } represents a set that’s only element is the empty set.
2. Yes, the set (2, 3] is equivalent to 2 < x 3. (2, 3] is an infinite set that contains real numbers between 2 and 3. ‘(‘ defines the set to be non-inclusive to 2, and ‘]’ defines the set to be inclusive of 3.
3. **n 4**
4. = U – S U is the universal set

S = (2, 5)

**(-, 2] [5, )**

1. **Range of f is [0, 4].**

f(x) = x2

the derivative of f(x), f’(x) = 2x

In the domain [0, 2], f’(x) 0.

Therefore, f is an increasing function.

f(0) = 0, and f(2) = 4

1. **No, f(x) = x2 is not injective.**

f(x) does not pass the horizontal line test:

f(1) = 12 = 1

f(-1) = (-1)2 = 1

f(1) = f(-1) therefore f(x) is not injective.

1. Show that f is both injective and surjective by definition of bijective:

f(0, 0) = f(0, 0 0) = (0, 0)

f(0, 1) = f(0, 0 1) = (0, 1)

f(1, 0) = f(1, 1 0) = (1, 1)

f(1, 1) = f(1, 1 1) = (1, 0)

Because the f is one-to-one, it is injective.

Because the domain of f is equal to its range, it is surjective.

Therefore, f is bijective.

Showing g is not bijective:

g(0, 0) = f(0, 0 0) = (0, 0)

g(0, 1) = f(0, 0 1) = (0, 0)

g(1, 0) = f(1, 1 0) = (1, 0)

g(1, 1) = f(1, 1 1) = (1, 1)

Because g is not one-to-one, it is not bijective.

Showing h is not bijective:

h(0, 0) = f(0, 0 0) = (0, 0)

h(0, 1) = f(0, 0 1) = (0, 1)

h(1, 0) = f(1, 1 0) = (1, 1)

h(1, 1) = f(1, 1 1) = (1, 1)

Because h is not one-to-one, it is not bijective.

As to the relation to the question in Homework 1, this is why the AND and OR operations could not be used to build a key (the C and D disks) for bit recovery. The lack of unique outputs (one-to-one) prevents the original bits from being determined by the key.

1. If 1 < 3x + 5 < 2, then = 2 Given by the ceiling function

If 2 < 3x + 5 3, then = 3. Given by the ceiling function

1 < 3 Subtract 5 from the inequality

-4 < 3x -2 Divide inequality by 3

< x Solution

1. The formula from the lecture is: .

**is the simplification of the geometric sum**

1. a3 = 5, a11 = 87 Given

an = a1 + d(n – 1) Given formula

a3 = a1 + d(2) Plug a3 into formula

a11 = a1 + d(10) Plug a11 into formula

a11 – a3 = a1 + d(10) – a1 – d(2) = 87 – 5 Subtract

d(8) = 82 Simplify

**d =** Conclusion

1. Given

Simplify with rules of exponents

Move constant to front of summation.

Simplify and rewrite in the form:

Use the given formula from the lecture:

] Simplify denominator, and factor out

] Simplify and end.

1. EXTRA CREDIT:

Text

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