Rocky Ferdenchet   10944800 a9

1\. A. Suppose A is a set $(1, 2.5, 3)$ and B is a set $B = \{n \mid n \in \mathbb{Z}\}$. Then $A - B$ = finite

B. Suppose $A = \{n \mid n \in \mathbb{Z}\}$, and $B = \{x \mid x \in \mathbb{R}\}$. Then $A - B$ is countably infinite because it is a set of all integers real numbers

C. Suppose $A = \{n \mid n \in \mathbb{R}\}$, and $B = [0, 1]$. Then $A - B$ = All real numbers $- [0, 1]$ $= [0, 1]$. That is uncountably infinite.

I am going to use proof by example

2. $A \oplus B = (A \cup B) - (A \cap B) = (A - B) \cup (B - A)$

Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 2, 3\}$

$(A \cup B) = \{1, 2, 3, 4, 5\}$ $\quad (A \cap B) = \{1, 2, 3\}$

$(A \cup B) - (A \cap B) = A \oplus B$

$\{1, 2, 3, 4, 5\} - \{1, 2, 3\} = \{4, 5\}$

$(A - B) = \{4, 5\}$ $\quad (B - A) = \{\emptyset\}$, or empty set

$(A - B) - (B - A) = A \oplus B$

$\{4, 5\} - \{\emptyset\} = \{4, 5\}$

3. A. $A \cup B = A$ 1. If B is an empty set, $B = \{\emptyset\}$

then $A \cup \{\emptyset\} = A$

2. If $B \subseteq A$ then $A \cup B = A$

Subset

B. $A \cap B = A$

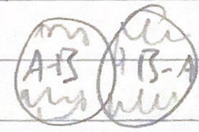
1. If $A \subseteq B$ then $A \cap B = A$

C. $A - B = A$

1. If $B = \{\emptyset\}$, then $A - B = A$

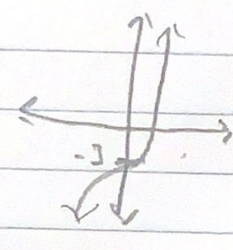
D. $A \cap B = B \cup A$, This is always true for any given sets.

3.e. $A-B = B-A$. This is not possible because $A-B$ is a subset of A that is not in B. This cannot be equal to the resultant set of $B-A$. They are opposites.



4. A. Not a one-to-one function. $f(0,1) = 1$ and $f(1,0) = 1$. Therefore, not bijection

B. Bijection. This is because x^3 is one to one and onto.



no y value is repeated

C. $f(n,m) = 2m - n$ Not one-to-one, therefore not bijection. $f(-1,0) = \boxed{-2}$ and $f(0,2) = \boxed{-2}$.

5.A $a_n = n_{n-1} + 2n + 3$

n	$f(n)$	factors of $f(n)$
0	4	2^2
1	9	3^2
2	16	4^2
3	25	5^2

$(n+2)^2$

$\boxed{a(n) = (n+2)^2}$

B. $a_n = a_{n-1} + 2a_{n-2} + 2n - 9$

n	$f(n)$
0	

6. A. $\sum_{i=0}^{2}\sum_{j=0}^{3} i^2 j^3$

$$\sum_{i=0}^{2}\left[\sum_{j=0}^{3}(i^2 j^3)\right] = \sum_{i=0}^{2}\left((i^2\cdot 0)+(i^2\cdot 1)+(i^2\cdot 8)+(i^2\cdot 27)\right)$$

$$=[(1^2\cdot 0)+(1^2\cdot 1)+(1^2\cdot 8)+(1^2\cdot 27)]+[(2^2\cdot 0)+(2^2\cdot 1)+(2^2\cdot 8)+(2^2\cdot 27)]$$

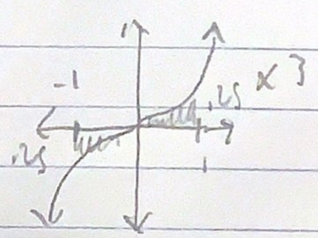
$$= 0+1+8+27+0+4+32+108 = \boxed{180}$$

B. $\sum_{i=3}^{\infty} x^i \qquad (x|<1)$

Area under $y = x^3$ from $-1<x<1$

$$\int_{-1}^{1} x^3\,dx = \frac{1}{4}x^4\Big]_{-1}^{1} = \frac{1}{4}(1)^4 - \frac{1}{4}(-1)^4$$

$$= .25 - .25 = \boxed{0}$$



$= 0$

7. A. countable, If $A \subset B$ then $|A| < |B|$
thus $|A|$ is countable

B. uncountable. Suppose A is set of all integers divisible by 5. $|A| = \infty$ or uncountable. Suppose B is a set of integers divisible by 7. Then $A - B$ is still uncountable. Uncountable - Uncountable set = uncountable set

C. Countable, $|\{3, 5\}| = 2$, only 2 elements in set

D. $A - B$ uncountable sets minus an countable sets are always uncountable. $\infty - n = \infty$

E. A finite set that is manipulated is still countable. $|A| \cdot n$ = countable.