HW5 (CSCI-C241)

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6 February 2024

1. Question One
   (a) 2
   (b) 1, 2, 6
   (c) 1
   (d) 6, 9
   (e) $\frac{3}{2}$, 4, 2.5
   (f) 1, 3, 4, 5
   (g) 3, 4, 5, 6
   (h) 1, 3
2. Question Two
   (a) $\frac{1}{2}$
   (b) -1
   (c) 2
   (d) 1, 8, 81
   (e) $\{1\}$
   (f) This is not possible, as there are no members in the empty set.
3. Question Three
   (a) False
   (b) True
   (c) False
   (d) False
   (e) True
   (f) False
   (g) True
4. Question Four
   (a) This would be true, as $a = 5, b = 6$, $5 \in A, 6 \in B$, and $5 + 6 = 11$
   (b) This would be false, because the largest numbers in each set equal to 13 ($a = 5, b = 8$)
   (c) These are not equal, $1 \in D$, $1 \notin S$
   (d) These are equal, as C has the exact same members as $\{3, 5, 1\}$
   (e) These are equal, as C has the exact same members as $\{1, 5, 1, 3, 1, 5, 5, 1, 3\}$, even though the given set has duplicates those should be ignored as duplicates don't exist in sets
   (f) These are not equal, $\varnothing \in \{\varnothing\}$, $\varnothing \notin \varnothing$
5. Question Five
   (a) $\{1, 3, 5, 7, 9, 10\}$
   (b) $\{4\}$
   (c) $\{4\}$

(d) $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
(e) $\{\}$
(f) $\{1, 3\}$
(g) $\{1, 3, 5\}$
(h) $\{1, 2, 3, 4, 5\}$
(i) $\{2, 4\}$
(j) $\{\}$
(k) $\{\}$
(l) $\{0, 2, 4, 6, 8\}$

6. Question Six
$\{\frac{x}{2} \mid x \in \mathbb{N} \land x \leq 8\}$

7. Question Seven
$\{2x \mid x \in \mathbb{N} \land x \leq 4\}$

8. Question Eight

(a) $|B| = 5$
(b) $|S| = 4$
(c) $|X| = 6$
(d) $|\{x \mid x \in \mathbb{N} \land x \leq 1000\}| = 1001$
(e) $|\varnothing| = 0$
(f) $|A \setminus B| = 3$
(g) $|Q| =$ infinite
(h) $|\mathbb{Z}| =$ infinite

9. Question Nine

(a) {'a', 'b', 'c'}
(b) {'four', 'pink', 'roof'}
(c) $\{\varnothing, \{\text{'a'}\}\}$
(d) $\{s \mid s \in \text{Str} \land |s| \text{ is even} \land |s| > 2\}$
(e) {'a', 'b', 'c', 'd', 'e'}
(f) {'e', 'i'}
(g) {'jumper', 'public'}
(h) {{'b', 'c'}}

10. Question Ten

(a) True
(b) True
(c) False
(d) True
(e) False
(f) True
(g) False
(h) False
(i) False
(j) False
(k) False
(l) True
(m) True

(n) False

(o) False

(p) True

(q) True

(r) True

11. Question Eleven

(a) False, i $\in V$, i $\notin A$

(b) True, because each string with a cardinality of four has an even cardinality

(c) False, fraction $\in S_{\text{even}}$, fraction $\notin S_4$

(d) False, because a powerset is a set of subsets, where the string 'a' by itself is not in any set.

(e) True, because a powerset is a set of subsets of set A, and both 'a' and 'b' are members of set A

(f) True, because a powerset is a set of subsets of set A, and 'a' is a member of set A

(g) False, $\{a, c\} \in X$, $\{a, c\} \notin Y$

12. Question Twelve

(a) $|\mathcal{P}(C)| = 2^{|C|} = 2^3 = 8$

(b) $|\mathcal{P}(V)| = 2^{|V|} = 2^5 = 32$