CS2022/MA2201
HW#2 SOLUTIONS

1. **a**) 0 **b**) 1 **c**) 2 **d**) 3

2. **a**) no
b) yes $\{a\}$
c) no
d) yes $\{a, b\}$

3. $(A = \varnothing) \vee (B = \varnothing)$

4. A={1, 3, 5, 6, 7, 8, 9}, B={2, 3, 6, 9, 10}

5. **a**) *no* Consider A={1}, B={1,2}, C={2}. $A \cup C = B \cup C$ = {1,2} although $A \neq B$.
b) *no* Consider A={1,2}, B={2,3}, C={2}. $A \cap C = B \cap C$ = {2} although $A \neq B$.

6. **a**) $f(n)=n+1$
b) $f(n) = 2\left\lfloor \frac{n}{2} \right\rfloor$
c) $f(n)$=**if** *even*(n) **then** $n+1$ **else** $n-1$
d) $f(n)=42$

7. $$\sum_{k=1}^{n} \frac{1}{k(k+1)} = \sum_{k=1}^{n} \left(\frac{1}{k} - \frac{1}{k+1} \right) = \left(1 - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + \ldots + \left(\frac{1}{n} - \frac{1}{n+1}\right)$$
$$= 1 + \left(\frac{1}{2} - \frac{1}{3}\right) + \left(\frac{1}{3} - \frac{1}{4}\right) + \ldots + \left(\frac{1}{(n-1)} - \frac{1}{n}\right) - \frac{1}{n+1} = 1 - \frac{1}{n+1}$$