

Number, Sets and Functions 2023 Exam

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Contents

1 Question One

1

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Let $X = \{1, 3, 4, 6, 9\}$ and let $Y = \{2, 3, 5, 8, 9\}$.

Write down each of the following sets. *No justification is needed,*

(a) $X \cup Y$,

answer: $\{1, 2, 3, 4, 5, 6, 8, 9\}$.

✓

(b) $X \triangle Y$,

answer: $\{1, 2, 4, 5, 6, 8\}$.

✓

(c) $\{x \in X : x + 2 \notin X\}$,

answer: $\{3, 6, 9\}$.

✓

(d) $\{y + 2 : y \in Y \wedge y - 2 \in X\}$,

answer: $\{5, 7, 10\}$.

✓

Write down the supremum of each of the following sets

(e) $\{x^2 : -2 \leq x \leq 1\}$,

answer: 1.

✗

Answer is 4, Simply square -2 .

(f) $\left\{ \frac{n}{n+1} : n \in \mathbb{N} \right\}$,

answer: $\frac{n}{n+1} = \frac{1}{1 + \frac{1}{n}}$,

$\lim_{n \rightarrow \infty} \frac{1}{1 + \frac{1}{n}} = \frac{1}{1+0} = 1$.

✓

(g) $\{\sin(x) : x \in \mathbb{Q}\}$,

answer: 1.

✓