

MATHS

NCERT - NCERT MATHEMATICS(GUJRATI ENGLISH)

SETS

Exercise 2.1

1. Which of the following are sets? Justify your answer

(i) The collection of all the months of a year beginning with the letter "J".

(ii) The collection of ten most talented writers of India.

(iii) A team of eleven best cricket batsmen of the world.

(iv) The collection of all boys in your class.

(v) The collection of all even integers.

Answer: (i) Set (ii) Not set (iii) Not set (iv) Set (v) Set



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2. If $A = \{0, 2, 4, 6\}$, $B = \{3, 5, 7\}$ and $C = \{p, q, r\}$, then fill the appropriate symbol \diagup or in the blanks

(i) 0.....A (ii) 3....C (iii) 4....B

(iv) 8....A (v) p....C (vi) 7.....B

Answer: (i) (ii) / (iii) / (iv) / (v)

(vi)



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3. Express the following statements using symbols.

(i) The element 'x' does not belong to 'A'.

(ii) 'd' is an element of the set 'B'.

(iii) 'l' belongs to the set of Natural numbers.

(iv) '8' does not belong to the set of prime numbers

P.

Answer: (i) / (ii) (iii)



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4. State whether the following statements are true or false. Justify your answer

(i) / set of prime numbers

(ii) $S = \{5, 6, 7\}$ implies

(iii) / where 'W' is the set of whole numbers

(iv) — where's 'Z' is the set of integers.

Answer: (i) False (ii) False (iii) True



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5. Write the following sets in roster form

(i) $B = \{x : x \text{ is a natural number smaller than } 6\}$

$C = \{x : x \text{ is a two-digit natural number such that the sum of its digits is } 8\}$.

(iii) $D = \{x : x \text{ is a prime number which is a divisor of } 60\}$.

$E = \{x : x \text{ is an alphabet in BETTER}\}$.

Answer: (i) $B = \{1, 2, 3, 4, 5\}$

(ii) $C = \{17, 26, 35, 44, 53, 62, 71, 80\}$

(iii) $D = \{5, 3\}$

(iv) $E = \{B, E, T, R\}$



6. Write the following sets in the set-builder form

(i) $\{3,6,9,12\}$ (ii) $\{2,4,8,16,32\}$

(iii) $\{5,25,125,625\}$ (iv) $\{1,4,9,16,25,100\}$

Answer: (i) $A = \{x : x \text{ is multiple of } 3 \text{ \& less than } 13\}$

(ii)

(iii)

(iv) $D = \{x : x \text{ is a square number and}$



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7. Write the following sets in roster form

(i) $A = \{x : x \text{ is a natural number greater than 50 but smaller than 100}\}$

$B = \{x : x \text{ is an integer,}$

(iii) $D = \{x : x \text{ is a letter in the word "LOYAL"}\}$

Answer: (i) $A = \{51, 52, 53, \dots, 98, 99\}$

(ii) $B = \{+2, -2\}$

(iii) $D = \{L, O, Y, A\}$



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8. Match the roster form with set builder form.

(i) $\{1, 2, 3, 6\}$ (a) $\{x : x \text{ is prime number and a divisor of } 6\}$

(ii) $\{2,3\}$ (b) $\{x : x \text{ is an odd natural number smaller than } 10\}$

(iii) $\{m,a,t,h,e,l,c,s\}$ (c) $\{x : x \text{ is a natural number and divisor of } 6\}$

(iv) $\{1,3,5,7,9\}$ (d) $\{x : x \text{ is a letter of the word MATHEMATICS}\}$

Answer: (i) -(c)

(ii) -(a)

(iii) (d)

(iv) (b)



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1. If $A=\{1,2,3,4\}$ and $B=\{1,2,3,5,6\}$, then find

Are they equal.

Answer: Yes, A and B are not equal.

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2. If $A=\{0,2,4\}$, find $A \cup B$.

Comment.

Answer:

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3. If $A=\{2,4,6,8,10\}$ and $B=\{3,6,9,12,15\}$. Find $A-B$ and $B-A$.

Answer: $A-B=\{2,4,8,10\}$

$B-A=\{3,9,12,15\}$



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4. If A and B are two sets such that _____ then
what is _____

Answer:



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5. Let $A = \{x : x \text{ is a natural number}\}$, $B = \{x : x \text{ is an even natural number}\}$

$C = \{x : x \text{ is an odd natural number}\}$ and $D = \{x : x \text{ is a prime number}\}$

Find

Answer: $\{2, 4, 6, \dots\}$

$= \{ \text{even natural numbers} \}$

$\{ \text{even natural number} \}$

$= \{3, 5, 7, 11, \dots\}$



6. If $A=\{3,6,9,12,15,18,21\}$, $B=\{4,8,12,16,20\}$
 $C=\{2,4,6,8,12,14,16\}$ and $D=\{5,10,15,20\}$, find
- (i) $A-B$ (ii) $A-C$ (iii) $A-D$ (iv) $B-A$ (v) $C-A$
 (vi) $D-A$ (vii) $B-C$ (viii) $B-D$ (ix) $C-B$ (x) $D-B$

Answer: (i) $A-B = \{3,6,9,15,18,21\}$

(ii) $A-C = \{3,9,15,18,12\}$

(iii) $A-D = \{3,6,9,12,18,21\}$

(iv) $B-A = \{4,8,16,20\}$

(v) $C-A = \{2,4,8,10,16\}$

(vi) $D-A = \{5,10,20\}$

$B-C = \{20\}$

(viii) $B-D = \{4,8,12,16\}$

(ix) $C-B=\{2,6,10,14\}$

(x) $D-B=\{5,10,15\}$



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7. State whether each of the following statements is true or false. Justify your answers.

(i) $\{2,3,4,5\}$ and $\{3,6\}$ are disjoint sets.

(ii) $\{a,e,l,o,u\}$ and $\{a,b,c,d\}$ are disjoint sets.

(iii) $\{2,6,10,14\}$ and $\{3,7,11,15\}$ are disjoint sets.

(iv) $\{2,6,10\}$ and $\{3,7,11\}$ are disjoint sets.

Answer: (i) False, because they have common element '3'

(ii) False, because the two sets have a

common element 'a'

(iii) True, because no common elements for the sets.

(iv) True, because no common elements for the sets.



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Exercise 2.3

1. Which of the following sets are equal?

$A = \{x : x \text{ is a letter in the word FOLLOW}\}$, $B = \{x : x \text{ is a letter in the word FLOW}\}$ and $C = \{x : x \text{ is a}$

letter in the word WOLF}

Answer: Yes, equal sets



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2. Consider the following sets and fill up the blanks with _____ as to make the statement true.

$A = \{1, 2, 3\}$ $B = \{\text{The first three natural numbers}\}$

$C = \{a, b, c, d\}$ $D = \{d, c, a, b\}$

$D = \{a, e, i, o, u\}$ $F = \{\text{sets of vowels in English Alphabet}\}$

(i) $A \dots B$ (ii) $A \dots E$ (iii) $C \dots D$

(iv) $D \dots F$ (v) $F \dots A$ (vi) $D \dots E$ (vii) $F \dots B$

Answer: (i) Equal(=) (ii) Not equal (iii)

Equal(=) (iv) Not equal

(v) Not equal

(vi) Not equal

(vii)



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3. In each of the following, state whether $A=B$ or not.

(i) $A=\{a,b,c,d\}$ $B=\{d,c,a,b\}$

(ii) $A=\{4,8,12,16\}$ $B=\{8,4,16,18\}$

(iii) $A=\{2,4,6,8,10\}$ $B=\{x : x \text{ is a positive even integer and}$

(iv) $A=\{x : x \text{ is a multiple of } 10\}$ $B=\{10, 15, 20, 25 30\dots\}$

Answer: (i) $A=B$ (ii)

(iii) $A=B$ (iv)



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4. State the reasons for the following :

(i) $\{1,2,3,\dots,10\}$

(ii) $\{2,4,6,8,10\}$

(iii) $\{5,15,30,45\}$ $\{x : x \text{ is a multiple of } 15\}$

(iv) $\{2,3,5,7,9\}$ $\{x : x \text{ is a prime number}\}$

Answer: (i)

(ii) $x=2x+1$ means x is odd

(iii) x is multiple of 15. So 5 does not exist

(ix) x is prime number but 9 is not a prime number



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5. List all the subsets of the following sets.

(i) $B=\{p,q\}$ (ii) $C=\{x,y,z\}$ (iii) $D=\{a,b,c,d\}$ (iv)

$E=\{1,4,9,16\}$ (v) $F=\{10,100,1000\}$

Answer: (i) $\{p\}, \{q\}, \{p,q\},$

(ii)

(iii) $\{a\}, \{b\}, \{c\}, \{d\}, \{a,b\}, \{b,c\}, \{c,d\}, \{a,c\},$

$\{a,d\}, \{b,d\}, \{b,d\}, \{a,b,c\}, \{b,c,d\}, \{a,b,d\},$

$\{a,c,d\}, \{a,b,c,d\},$

(iv) $\{1\}, \{4\}, \{9\}, \{16\}, \{1,4\}, \{1,9\}, \{1,16\}, \{4,9\},$

$\{4,16\}, \{9,16\}, \{1,4,9\}, \{1,9,16\}, \{4,9,16\}, \{1,4,16\},$

$\{1,4,9,16\}.$

(v) , $\{10\}$, $\{100\}$, $\{1000\}$, $\{10,100\}$, $\{100,1000\}$,
 $\{10,1000\}$, $\{10,100,1000\}$



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Exercise 2.4

1. State which of the following sets are empty and which are not?

(i) The set of lines passing through a given point.

(ii) Set of odd natural numbers divisible by 2.

(iii) $\{x : x \text{ is a natural number,}$

(iv) $\{x : x \text{ is a common pomf to any two parallel lines}\}$

(v) Set of even prime numbers.

Answer: (i) Not empty (ii) Empty (iii) Empty (iv) Empty (v) Not empty



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2. State whether the following sets are finite or infinite.

(i) The set of months in a year. (ii) $\{1, 2, 3, \dots, 99, 100\}$

(iii) The set of prior numbers smaller than 99.

(iv) The set of letters in the English alphabet.

(v) The set of lines that can be drawn are parallel to the X-axis

(vi) The set of numbers which are multiples of 5.

(vii) The set of circles passing through the origin (0,0).

Answer: (i) Finite (ii) Finite (iii) Finite

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Do This

1. Identify and write the "common property" of the following collections.

2,4,6,8

Answer: (i) Finite (ii) Infinite (iii) Infinite (iv)

Infinite



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2. Identify and write the "common property" of the following collectons.

2,3,5,7,11



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3. Identify and write the "common property" of the following collectons.

1,4,9,16....



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4. Identify and write the "common property" of the following collectons.

January, February, March, April,.....



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5. Identify and write the "common property" of the following collectons.

Thumb, index finger, middle finger, ring finger, pinky.



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6. Write the following sets:

Set of the first five positive integers.



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7. Write the following sets:

Set of multiples of 5 which are more than 100 and less than 125



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8. Write the following sets:

Set of first five cubic numbers.

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9. Write the following sets:

Set of digits in the Ramanujan number.

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10. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct symbols.

1

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11. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct symbols.

0



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12. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct

symbols.

-4



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13. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct symbols.

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14. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct symbols.



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15. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct symbols.

—



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16. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct symbols.

$\log 2$



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17. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct symbols.

0.03



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18. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct symbols.



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19. Some numbers are give below. Decide the numbers to which numbers sets they belong to and does not belong to and express with correct

symbols.



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20. List the elements the following sets.

(i) $G = \{\text{all the factors of } 20\}$

(ii) $F = \{\text{multiples of } 4 \text{ between } 17 \text{ and } 61 \text{ which are divisible by } 7\}$

(iii) $S = \{x : x \text{ is a letter in the word 'MADAM'}\}$

(iv) $P = \{x : x \text{ is a whole number between } 3.5 \text{ and } 6.7\}$



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21. Write the following sets in the roster form.

(i) B is the set of all months in a year having 30 days.

(ii) P is the set of all prime numbers smaller than 10.

(iii) X is the set of colours of the rainbow.



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22. A is the set of factors of 12. Which one of the following is not a member of A.

(A) 1 (B) 4 (C) 5 (D) 12



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23. $A=\{1,2,3,4\}$, $B=\{2,4\}$, $C=\{1,2,3,4,7\}$, $F=\{\}$.

Fill in the blanks with

(i) $A \dots b$ (ii) $C \dots A$ (iii) $B \dots A$

(iv) $A \dots C$ (v) $B \dots C$ (vi)



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24. State which of the following statement are true.

(i) (ii) (iii)



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25. Let $A=\{1,3,7,8\}$ and $B=\{2,4,7,9\}$. Find



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26. If $A=\{6,9,11\}$, $B=\{\}$. Find .



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



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28. If $A=\{4,5,6\}$, $B=\{7,8\}$ then show that



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29. If $A=\{1,2,3,4,5\}$ and $B=\{4,5,6,7\}$, then find $A-B$ and $B-A$. Are they equal?



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30. If $V=\{a,e,l,o,u\}$ and $B=\{a,l,k,u\}$. Find $V-B$ and $B-V$.



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31. Which of the following are empty sets? Justify your answer.

(i) Set of integer which lie between 2 and 3.

(ii) Set of natural numbers that are smaller than 1.

(iii) Set of odd numbers that leave remainder zero, when divided by 2.



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32. State which of the following sets are finite and which are finited. Give reasons for your answer.

(i)

(ii)

(iii)

(iv) $D = \{1, 2, 3, 4\}$

(v) $\{x : x \text{ is a day of the week}\}$



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33. Tick the set which is infinite

(A) The set of whole numbers

(B) The set of

prime numbers

(C) The set of integers

(D) The set of

factors of 10



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[Try This](#)

1. Write some sets of your choice, involving algebraic and geometrical ideas.



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2. Match roster forms with the set builder form.

(i) {p,r,l,n,c,a,l} (a) {x : x is a positive integer and is a divisor of 18}

(ii) {0} (b) {x : x is an integer and

(iii) {1,2,3,6,9,18} (c) {x : x is an integer and $x+1=1$ }

(iv) {3,-3} (d) {x : x is a letter of the word PRINCIPAL}



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3. $A = \{\text{set of quadrilaterals}\}$, $B = \{\text{square, rectangle, trapezium, rhombus}\}$. State whether $B \subset A$. Justify your answer.



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4. If $A = \{a, b, c, d\}$. How many subsets does the set A have?

(A) 5 (B) 6 (C) 16 (D) 65



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5. P is the set of factors of 5, Q is the set of factors of 25 and R is the set of factors of 125. Which of the following is false?

- (A) (B) (C) (D)

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6. A is the set of prime number less than 10, B is the set of odd numbers less than 10 and C is the set of even numbers of less than 10. Which of the following statements are true?

- (i) (ii) (iii) (iv) (v)
- (vi)



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7. List out some sets A and B and choose their elements such that A and B are disjoint.



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8. If $A = \{2, 3, 5\}$. Find $\mathcal{P}(A)$ and compare.



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9. If $A=\{1,2,3,4\}$ and $B=\{1,2,3,4,5,6,7,8\}$, then find $A \cap B$. What do you notice about the result?



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10. Let $A=\{1,2,3,4,5,6\}$ and $B=\{2,4,6,8,10\}$. Find the intersection of A and B.



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11. Which of the following sets are empty sets? Justify your answer.

(i)

(ii) The set of all triangles in a plane having the sum of their three angles less than 180.



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Example

1. Let $A=\{2,5,6,8\}$ and $B=\{5,7,9,1\}$. Find



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2. Let $A=\{a,e,l,o,u\}$ and $B=\{a,l,u\}$. Show that



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3. If $A=\{1,2,3,4\}$ and $B=\{2,4,6,8\}$. Find



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4. Find $A \cap B$ when $A=\{5,6,7,8\}$ and $B=\{7,8,9,10\}$



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5. If $A=\{1,2,3\}$ and $B=\{3,4,5\}$ then illustrate
in Venn- diagrams.





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6. Let $A=\{1,2,3,4,5\}$, $B=\{4,5,6,7\}$. Find $A-B$.



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7. If $A=\{p,q,r\}$ and $B=\{q,p,r\}$. Then check whether $A=B$ or not.



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8. If $A=\{1,2,3,\dots\}$ and N is the set of natural numbers, then check whether A and N are equal?



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9. Consider the sets $A = \{p, q, r, s\}$ and $B = \{1, 2, 3, 4\}$.

Are they equal?



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10. Let A be the set of prime number smaller than 6 and B be the set of prime factors of 30. Check if A and B are equal.



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11. Show that the sets C and B are equal, where

$C = \{x : x \text{ is a letter in the word 'ASSASSINATION'}\}$

$B = \{x : x \text{ is a letter in the word STATION}\}$



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12. Consider the sets

. Insert the symbol \subset between each of the following pair of sets.

(i) (ii) $A \dots B$ (iii) $A \dots C$ (iv) $B \dots C$



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13. State which of the following sets are finite or infinite.

(i) (ii)

(iii) (iv)

(v)



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14. If $A = \{1, 2, 3, 4, 5\}$, $B = \{2, 4, 6, 8\}$ then find



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