Discrete Mathematics Questions and Answers – Sets

This set of Discrete Mathematics Multiple Choice Questions & Answers (MCQs) focuses on "Sets".

1. A _____ is an ordered collection of objects.
a) Relation
b) Function
c) Set
d) Proposition
View Answer

Answer: c
Explanation: By the definition of set.

2. The set O of odd positive integers less than 10 can be expressed by _____
a) {1, 2, 3}
b) {1, 3, 5, 7, 9}
c) {1, 2, 5, 9}
d) {1, 5, 7, 9, 11}
View Answer

Answer: b
Explanation: Odd numbers less than 10 is {1, 3, 5, 7, 9}.

3. Power set of empty set has exactly _____ subset.
a) One
b) Two
c) Zero
d) Three
View Answer

Answer: a
Explanation: Power set of null set has exactly one subset which is empty set.

4. What is the Cartesian product of A = {1, 2} and B = {a, b}?
a) {(1, a), (1, b), (2, a), (b, b)}
b) {(1, 1), (2, 2), (a, a), (b, b)}
c) {(1, a), (2, a), (1, b), (2, b)}
d) {(1, 1), (a, a), (2, a), (1, b)}
View Answer

Answer: c
Explanation: A subset R of the Cartesian product A x B is a relation from the set A to the set B.

5. The Cartesian Product B x A is equal to the Cartesian product A x B. Is it True or False?
a) True
b) False
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Answer: b
Explanation: Let A = {1, 2} and B = {a, b}. The Cartesian product A x B = {(1, a), (1, b), (2, a), (2, b)} and the Cartesian product B x A = {(a, 1), (a, 2), (b, 1), (b, 2)}. This is not equal to A x B.

6. What is the cardinality of the set of odd positive integers less than 10?
a) 10
b) 5
c) 3
d) 20
View Answer

Answer: b
Explanation: Set S of odd positive an odd integer less than 10 is {1, 3, 5, 7, 9}. Then, Cardinality of set S = |S| which is 5.

7. Which of the following two sets are equal?
a) A = {1, 2} and B = {1}
b) A = {1, 2} and B = {1, 2, 3}
c) A = {1, 2, 3} and B = {2, 1, 3}
d) A = {1, 2, 4} and B = {1, 2, 3}
View Answer

Answer: c
Explanation: Two set are equal if and only if they have the same elements.

8. The set of positive integers is _____
a) Infinite
b) Finite
c) Subset
d) Empty
View Answer

Answer: a
Explanation: The set of positive integers is not finite.

9. What is the Cardinality of the Power set of the set {0, 1, 2}.
a) 8
b) 6

c) 7
d) 9
View Answer

Answer: a
Explanation: Power set P ({0, 1, 2}) is the set of all subsets of {0, 1, 2}. Hence,P({0, 1, 2}) = {null , {0}, {1}, {2}, {0, 1}, {0,2}, {1, 2}, {0, 1, 2}}.

10. The members of the set S = {x | x is the square of an integer and x < 100} is
_____

a) {0, 2, 4, 5, 9, 58, 49, 56, 99, 12}
b) {0, 1, 4, 9, 16, 25, 36, 49, 64, 81}
c) {1, 4, 9, 16, 25, 36, 64, 81, 85, 99}
d) {0, 1, 4, 9, 16, 25, 36, 49, 64, 121}
View Answer

Answer: b
Explanation: The set S consists of the square of an integer less than 10.

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1 . Which of the following sets are null sets ?

| A. | { } | B. | Ø |
| C. | Both (a) and (b) | D. | {0} |

Answer & Explanation

Answer: C

Explanation:

Both (a) and (b)
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2 . Let R be a non-empty relation on a collection of sets defined by ARB if and only if A ∩ B = Ø Then (pick the TRUE statement)
A.R is relexive and transitive
B.R is an equivalence relation
C.R is symmetric and not transitive
D.R is not relexive and not symmetric
Answer & Explanation

Answer: C

Explanation:

R is symmetric and not transitive
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3 . The binary relation S = Φ (empty set) on set A = {1, 2,3} is
A.transitive and relexive
B.symmetric and relexive
C.transitive and symmetric
D.neither reflexive nor symmetric
Answer & Explanation

Answer: C

Explanation:

transitive and symmetric
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4 . Number of subsets of a set of order three is

A.	2	B.	4
C.	6	D.	8

Answer & Explanation

Answer: D

Explanation:

8
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5 . "n/m" means that n is a factor of m, then the relation T is
A.relexive, transitive and not symmetric
B.relexive, transitive and symmetric
C.transitive and symmetric
D.relexive and symmetric
Answer & Explanation

Answer: A

Explanation:

relexive, transitive and not symmetric
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6 . If R be a symmetric and transitvie relation on a set A, then
A.R is not reflexive and hence not an equivalence relation
B.R is reflexive and hence an equivalence relation
C.R is reflexive and hence a partial order
D.None of these

Answer: D

Explanation:

None of these

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7 . Let P(S) denote the power set of set S. Which of the following is always TRUE ?
A.S ∉ P(S)
B.P(P(S)) = P(S)
C.P(S) ∩ S = P (S)
D.P(S) ∩ P(P(S)) = [φ]

Answer: D

Explanation:

P(S) ∩ P(P(S)) = [φ]

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8 . The number of elements in the Power set P(S) of the set S = [[Φ] , 1, [2, 3]] is

A.	2	B.	4
C.	6	D.	8

Answer: D

Explanation:

8

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9 . If A and B are sets and A∪ B= A ∩ B, then

A.	A = B	B.	A = Φ
C.	B = Φ	D.	none of these

Answer: A

Explanation:

A = B

10 . Let S be an infinite set and S1, S2, S3, ..., Sn be sets such that S1 ∪S2 ∪S3∪ ....Sn = S then

A.atleast one of the sets Si is a finite set
B.atleast one of the sets Si is an ininite set
C.not more than one of the set Si can be inite
D.none of these
Answer & Explanation

Answer: B

Explanation:

atleast one of the sets Si is an ininite set
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11 . If X and Y are two sets, then X ∩ (Y ∪ X) C equals

A.   Ø   B.   X
C.   Y   D.   None of these
Answer & Explanation

Answer: A

Explanation:

Ø
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12 . If f : X -> Y and a, b ⊆ X, then f (a ∩ b) is equal to

A.f(a) - f(b)
B.f(a) ∩ f(b)
C.f(b) - f(a)
D.a proper subset of f(a) ∩ f(b)
Answer & Explanation

Answer: D

Explanation:

a proper subset of f(a) ∩ f(b)
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13 . Let f : R → R be defined by f(x)= {x+2 (x ≤ -1) { x2 (-1 ≤ x ≤1) {2 - x (x ≥ 1) Then value of f (-1.75) + f (0.5) + f (1.5) is

A.   0   B.   1
C.   2   D.   None of these

Answer: B

Explanation:

1

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14 . A relation R is defined on the set of positive integers as xRy if $2x + y \leq 5$. The realation R is
A.Reflexive
B.Transitive
C.Symmetric
D.None of these

Answer: B

Explanation:

transitive

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15 . Let R be na equivalence relation on the set {1,2,3,4,5,6} given by
{(1,1),(1,5),(2,2),(2,3),(2,6),(3,2),(3,3),(3,6),(4,4),(5,1),(5,5),(6,2),(6,6),(6,6)}. The partition included by R is

A. {1,2,3,4,5,6}	B. {{1,3,5,6},{2,4}}
C. {{1,2,3,4},{5,6}}	D. {{1,5},{2,3,6},{4}}

Answer: D

Explanation:

{{1,5},{2,3,6},{4}}

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16 . Which of the following sets is a null set ? I. X = {x | x= 9, 2x = 4 } II. Y = {x | x= 2x.x ≠ 0 } III. Z = { x | x-8 = 4 }

A. I and II only	B. I, II and III
C. I and III only	D. II and III only

Answer: A

Explanation:

I and II only

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17 . A Relation R is defined on the set of integers as xRy if (x + y) is even. Which of the following statements is TRUE?
A.R is an equivalence relation having three equivalence classes
B.R is an equivalence relation having two equivalence classes
C.R is an equivalence relation having one equivalence class
D.R is not an equivalence relation
Answer & Explanation

Answer: B

Explanation:

R is an equivalence relation having two equivalence classes

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18 . The number of elements in the power set of the set {{a, b}, c} is

A.	2	B.	4
C.	6	D.	8

Answer & Explanation

Answer: B

Explanation:

4

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19 . If R = ((1, 1), (3, 1), (2, 3), (4, 2)), then which of the following represents R2, where R2 is R composite R?
A.((1, 1), (2, 1), (4, 3), (3, 1))
B.((1, 1), (3, 1), (2, 3), (4, 2))
C.1(1, 3), (3, 3), (3, 4), (3, 2))
D.f(1, 1), (9, 1), (4, 9), (16, 4))
Answer & Explanation

Answer: A

Explanation:

((1, 1), (2, 1), (4, 3), (3, 1))

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20 . If f : R ---->R defined by f(x) = x2 + 1, then values of f -1 (17) and f -1(-3) are respectively

| A. | {4,-4},Ø | B. | {Ø},{3,-3} |
| C. | {3,-3},{Ø} | D. | {Ø}, (4, - 4) |

Answer & Explanation

Answer: A

Explanation:

{4,-4},Ø
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21 . If every element of a group G is its own inverse, then G is

| A. | abeian | B. | cyclic |
| C. | finite | D. | infinite |

Answer & Explanation

Answer: A

Explanation:

abeian
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22 . The universal relation A x A on A is
A.anti-symmetric
B.an equivalence relation
C.a partial ordering relation
D.not symmetric and not anti-symmetric
Answer & Explanation

Answer: B

Explanation:

an equivalence relation
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23 . Total number of diferent partitions of a set having four elements is

| A. | 5 | B. | 10 |
| C. | 15 | D. | 20 |

Answer & Explanation

Answer: C

Explanation:

15

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24 . A partition of {1, 2, 3, 4, 5} is the family
A.{(1, 2, 3),(5)}
B.{(1, 2,), (3, 4, 5)}
C.{φ(1, 2),(3, 4),(5)}
D.{(1, 2),(3, 4),(3, 5)}
Answer & Explanation

Answer: B

Explanation:

{(1, 2,), (3, 4, 5)}

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25 . Let s(w) denote the set of all the letters in w where w is an English word. Let us denote set equality, subset and union relations by =, ⊂ and ∪ respectively. Which of the following is NOT true?
A.s(ten) ⊂ s(twenty)
B.s(stored) = s(sorted)
C.s(sixty) ⊂ (s(six) ∪ s(twenty)
D.None of these
Answer & Explanation

Answer: D

Explanation:

None of these

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26 . In a beauty contest, half the number of experts voted for Mr. A and two thirds voted for Mr. B. 10 voted for both and 6 did not vote for either. How many experts were there in all ?

A.	18	B.	24
C.	36	D.	44

Answer & Explanation

Answer: B

Explanation:

24

27 . Let n(A) denotes the number of elements in set A. If n(A) =p and n(B) = q, then how many ordered pairs (a, b) are there with a ∈ A and b ∈ B ?

A.   p x q   B.   p + q
C.   2 pq   D.   4 pq

Answer & Explanation

Answer: A

Explanation:

p x q
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28 . The set of all Equivalence classes of a set A of cardinality C
A.forms a partition of A
B.is of cardinality 2C
C.has the same cardinality as A
D.none of these
Answer & Explanation

Answer: A

Explanation:

forms a partition of A
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29 . Let Z denote the set of all integers. Define f : Z —> Z by f(x) = {x / 2 (x is even) 0 (x is odd) then f is
A.one-one and onto
B.one-one but not onto
C.onto but not one-one
D.neither one-one nor-onto
Answer & Explanation

Answer: C

Explanation:

onto but not one-one
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30 . Let R be a relation "(x -y) is divisible by m", where x, y, m are integers and m > 1, then R is
A.partial order
B.equivalence relation
C.symmetric but not transitive

Answer: B

Explanation:

equivalence relation

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31 . A subset H of a group(G,*) is a group if
A.a,b ∈ H ⇒ a * b ∈ H
B.a ∈ H⇒ a-1 ∈ H
C.a,b ∈ H ⇒ a * b-1 ∈ H
D.H contains the identity element

Answer: C

Explanation:

a,b ∈ H ⇒ a * b-1 ∈ H

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32 . If A = {1, 2, 3} then relation S = {(1, 1), (2, 2)} is
A.symmetric only
B.anti-symmetric only
C.an equivalence relation
D.both symmetric and anti-symmetric

Answer: D

Explanation:

both symmetric and anti-symmetric

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33 . Which of the following statements is true?
A.Empty relation φ is reflexive
B.Every equivalence relation is a partial-ordering relation.
C.Number of relations form A = {x, y, z} to B= {1, 2} is 64.
D.Properties of a relation being symmetric and being ant-symmetric are negative of each other.

Answer: C

Explanation:

Number of relations form A = {x, y, z} to B= {1, 2} is 64.

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34 . Let A = {1, 2, ...3 } Define ~ by x ~ y ⇔ x divides y. Then ~ is
A.Symmetric
B.an equivalence relation
C.a partial-ordering relation
D.relexive, but not a partial-ordering
Answer & Explanation

Answer: C

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36 . If f : A ---> B is a bijective function, then f -1 of f =
A.F
B.f -1
C.f o f -1
D.IA(Identity map of the set A)
Answer & Explanation

Answer: D

Explanation:

IA(Identity map of the set A)

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37 . The set of all real numbers under the usual multiplication operation is not a group since
A.zero has no inverse
B.identity element does not exist
C.multiplication is not associative
D.multiplication is not a binary operation
Answer & Explanation

Answer: A

Explanation:

zero has no inverse

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38 . If (G, .) is a group such that (ab)- 1 = b-1 a-1, ∀ a, b ∈ G, then G is a/an
A.abelian group
B.non-abelian group
C.commutative semi group

None of these

Answer: A

Explanation:

abelian group

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39 . If * is defined on R* as a * b = (ab/2) then identity element in the group (R*, *) is

A.	1	B.	2
C.	1/2	D.	1/3

Answer & Explanation

Answer: B

Explanation:

2
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40 . If (G, .) is a group such that a2 = e, ∀ a ∈ G, then G is

A.	semi group	B.	abelian group
C.	non-abelian group	D.	none of these

Answer & Explanation

Answer: B

Explanation:

abelian group
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Explanation:

a partial-ordering relation
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35 . G(e, a, b, c} is an abelian group with 'e' as identity element. The order of the other elements are

A.	2,2,4	B.	2,2,3
C.	2,3,4	D.	3,3,3

Answer & Explanation

Answer: B

Explanation:

2,2,3

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1 . How many numbers can be formed with the digits 1, 6, 7, 8, 6, 1 so that the odd digits always occupy the odd places

A.	15	B.	12
C.	18	D.	18

Answer: C

Explanation:

NA

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2 . In how many ways can Ram choose a vowel and a constant from the letters of the word ALLAHABAD?

A.	4	B.	6
C.	9	D.	5

Answer: A

Explanation:

NA

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3 . Number of ways in which the letters of word GARDEN can be arranged with vowels in alphabetical order, is

A.	360	B.	240
C.	120	D.	480

Answer: A

Explanation:

NA

4 . The number of ways in which a couple can sit around a table with 6 guests if the couple take consecutive seat is

A.   1440   B.   720
C.   5040   D.   None of these

Answer & Explanation

Answer: A

Explanation:

NA

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5 . How many different words beginning with O and ending with E can be formed with the letters of the word ORDINATE, so that the words are beginning with O and ending with E?<

A.   8!   B.   6!
C.   7!   D.   7!/2!

Answer & Explanation

Answer: A

Explanation:

NA

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6 . A box contains 2 white balls and 4 red ball. in how many ways can 3 balls be drawn from the box , if at least one black ball is to be included i the draw ?

A.   32   B.   48
C.   64   D.   96

Answer & Explanation

Answer: C

Explanation:

NA

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7 . How many 3 – digit number can be formed from the digit 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated?

A.   5   B.   10
C.   15   D.   20

Answer & Explanation

Answer: D

Explanation:

NA
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8 . Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

A.   210   B.   1050
C.   25200   D.   21400
Answer & Explanation

Answer: C

Explanation:

NA
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9 . How many words can be formed by using all letters of the word 'BIHAR' ?

A.   110   B.   120
C.   130   D.   140
Answer & Explanation

Answer: B

Explanation:

NA
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10 . How many 6 digit number can be formed from the digits 1, 2, 3, 4, 5, 6 which are divisible by 4 and digits are not repeated?

A.   192   B.   122
C.   140   D.   242
Answer & Explanation

Answer: A

Explanation:

NA
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