Practice MCQs | Logics and Proofs | Discrete Mathematics

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1. **Which one of the following is a proposition?**
   1. How are you?
   2. What time is it?
   3. 4 + x� = 5
   4. India is in Europe.

Show Answer

**Answer :**     Option ( d )

1. **What is the negation of the statement “Salman sent more than 100 text messages every day”?**
   1. Salman sent more than 200 text messages every day.
   2. Salman sent less than 100 text messages but not every day.
   3. Salman did not send more than 100 text messages every day.
   4. Salman did not send any text message every day.

Show Answer

**Answer :**     Option ( c )

1. **Select the appropriate option after evaluating following four biconditionals are true or false.**

1) 2 + 2 = 4 if and only if 1 + 1 = 2.

2) 1 + 1 = 2 if and only if 2 + 3 = 4.

3) 1 + 1 = 3 if and only if fishes can fly.

4) 0 > 1 if and only if 2 > 1.

* 1. Only 1 and 3 are True
  2. Only option 3 and 4 are True
  3. Option 1 is True
  4. All options are false

Show Answer

**Answer :**     Option ( c )

1. **What will be Truth values of the statement**p↔¬p�↔¬�**for the Truth values T, F of p?**
   1. T, F
   2. F, T
   3. T, T
   4. F,F

Show Answer

**Answer :**     Option ( d )

1. **What will be Truth values of the statement (p ∧ q) → (p ∨ q) for the Truth values T,T,F,F of p and T,F,T,F of q?**
   1. T, F,T,F
   2. F, T,F,T
   3. T, T,T,T
   4. F,F,F,F

Show Answer

**Answer :**     Option ( c )

1. **If**p�**: “You can use the wireless network in the airport,”**q�**: “You pay the daily fee,” and**r�**: “You are a subscriber to the service”. Which is the right expression for the statement “To use the wireless network in the airport you must pay the daily fee unless you are a subscriber to the service”.**
   1. p∧r→p�∧�→�
   2. q∨r→p�∨�→�
   3. p∧(q∨r)�∧(�∨�)
   4. p∧(q∧r)�∧(�∧�)

Show Answer

**Answer :**     Option ( b )

1. **What is the negation of the statement “Sam is rich and happy”?**
   1. Sam is poor and unhappy.
   2. Either Sam is poor or happy
   3. Either Sam is poor or unhappy
   4. Sam is not rich and happy.

Show Answer

**Answer :**     Option ( c )

1. **Let Q(x, y) denote the statement “y is the capital of x.” What are these truth values? i) Q(Punjab, Chandigarh), ii) Q(India, New Delhi ) iii) Q(Rajasthan, Shimla), iv) Q(Nepal, Kathmandu)**
   1. T,F,T,F
   2. T,T,F,F
   3. T,T,F,T
   4. T,T,T,T

Show Answer

**Answer :**     Option ( c )

1. (¬q∧(p→q))→¬p(¬�∧(�→�))→¬�**is a**
   1. Contingency
   2. Tautology
   3. Contradiction
   4. None of these

Show Answer

**Answer :**     Option ( b )

1. (p→q)∧(p→r)(�→�)∧(�→�)**is logically equivalent to**
   1. p→(q∨r)�→(�∨�)
   2. p→(q∧r)�→(�∧�)
   3. p∧(q→r)�∧(�→�)
   4. p∧(q→r)�∧(�→�)

Show Answer

**Answer :**     Option ( b )

1. **`¬p ↔ ¬q is logically equivalent to**
   1. p→(q∨r)�→(�∨�)
   2. p→(q∧r)�→(�∧�)
   3. p∧(q→r)�∧(�→�)
   4. p∧¬(q→r)�∧¬(�→�)

Show Answer

**Answer :**     Option ( a )

1. ¬p↔q¬�↔�**is logically equivalent to**p↔¬q�↔¬�
   1. 1p ↔ ¬q`
   2. p↔q�↔�
   3. p∧¬q�∧¬�
   4. p∨¬q�∨¬�

Show Answer

**Answer :**     Option ( b )

1. (p→q)∧(q→r)→(p→r)(�→�)∧(�→�)→(�→�)**is a**
   1. Contingency
   2. Contradiction
   3. Tautology
   4. All the above are true

**If x and y are integers of opposite parity (one odd another even) the 5x+5y is**

* 1. Always Odd
  2. Always Even
  3. Odd for some values and even for other values
  4. Can not be decided

Show Answer

**Answer :**     Option ( a )

1. ¬(∀x∈A)p(x)¬(∀�∈�)�(�)**is logically equivalent to**
   1. (Ǝx∈A)¬p(x)(Ǝ�∈�)¬�(�)
   2. (Ǝx∈¬A)p(x)(Ǝ�∈¬�)�(�)
   3. (∀x∈¬A)p(x)(∀�∈¬�)�(�)
   4. (∀x∈A)¬p(x)(∀�∈�)¬�(�)

Show Answer

**Answer :**     Option ( a )

1. **Contrapositive of the statement “If you are honest, then you are respected.”**
   1. If You are honest then he is not respected.
   2. If You are not respected than you are not honest.
   3. If you are not honest then you are not respected.
   4. If you are respected then you are honest.

Show Answer

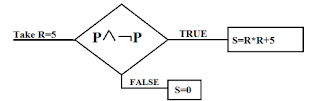
**Answer :**     Option ( b )

1. **Contrapositive of the statement “If Sahir is a poet, then he is poor”**
   1. If Sahir is rich then he is not poet
   2. If Sahir is not a poet then he is not poor
   3. If Sahir is not poor then he is a poet
   4. If Sahir is not a poet then he is not poor

Show Answer

**Answer :**     Option ( a )

1. **Let P: Dogs can fly And consider the following flow chart of a computer program Then the value of S is**

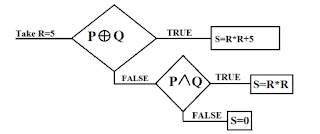
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* 1. 30
  2. 20
  3. 0
  4. 10

Show Answer

**Answer :**     Option ( c )

1. **Let P: 5+10=15, Q: 5\*10=50 And consider the following flow chart of a computer program Then the value of S is**

[](https://blogger.googleusercontent.com/img/a/AVvXsEgnVHoM2rdxNAuUQxumDXcsuxDYHwBCqP9EunrVo8F09neWf-ghQUAwFIXxr7xXBCrlJWSgh0y4EN0G-UMd-pJHd-zV9zceKw5qxV-_S8GzgJoS4DzbUcIvBfUfX8SxnErPa_P5I7GBpSVGicq5m-w-EVYCZTFKe2aEBs9lvzlfU2DAVhZKLgj4njvh0Q=s481)

* 1. 30
  2. 25
  3. 0
  4. 10

Show Answer

**Answer :**     Option ( a )

1. **What is the correct translation of the following statement into mathematical logic? “Some COVID 19 vaccines have complete the last trial are ready for production” where: COVID-19 vaccine, has completed the last trial, is ready for production.**
   1. Ǝx(t(x)∨p(x))Ǝ�(�(�)∨�(�))
   2. Ǝx(t(x)→p(x))Ǝ�(�(�)→�(�))
   3. Ǝx(t(x)∧p(x))Ǝ�(�(�)∧�(�))
   4. Ǝx(p(x)→t(x))Ǝ�(�(�)→�(�))

Show Answer

**Answer :**     Option ( c )

1. **Consider the following statements over the set of integers  
   P: k is even Q:**3k+13�+1**is odd  
   Then which of the following is/are true**
   1. Only converse for the proposition is true
   2. Only inverse for the proposition is true
   3. Both converse and inverse for the proposition is true
   4. Neither converse nor inverse for the proposition is true

Show Answer

**Answer :**     Option ( c )

1. **Which of the following statements is the contrapositive of the statement, “You win the game if you know the rules but are not over confident?”**
   1. If you lose the game then you don’t know the rules or you are overconfident
   2. A sufficient condition that you win the game is that you know the rules or you are not overconfident
   3. If you don’t know the rules or are overconfident you lose the game
   4. If you know the rules and are overconfident then you win the game

Show Answer

**Answer :**     Option ( a )

1. **In proving**ππ**as irrational, we begin with assumption**√7√7**is rational in which type of proof?**
   1. Direct proof
   2. Proof by Contradiction
   3. Vacuous proof
   4. Mathematical Induction

Show Answer

**Answer :**     Option ( b )

1. **Which of the following can only be used in disproving the statements?**
   1. Direct proof
   2. Contrapositive proofs
   3. Counter Example
   4. Mathematical Induction

Show Answer

**Answer :**     Option ( c )

1. **Let P: We should be honest., Q: We should be dedicated., R: We should be overconfident. Then ‘We should be honest or dedicated but not overconfident.’ is best represented by?**
   1. ¬PV¬QVR¬��¬���
   2. P∧¬Q∧R�∧¬�∧�
   3. PVQ∧R���∧�
   4. `P V Q ∧ ¬R

Show Answer

**Answer :**     Option ( d )

1. **What is the contrapositive of the conditional statement “I come to class whenever there is going to be a test”?**
   1. “If I come to class, then there will be a test.”
   2. “If I do not come to class, then there will not be a test.”
   3. “If there is not going to be a test, then I don’t come to class.”
   4. “If there is going to be a test, then I don’t come to class.”

Show Answer

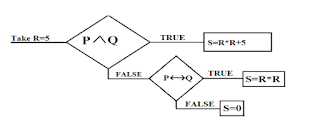
**Answer :**     Option ( b )

1. **Let**a�**and**b�**are the legs of a right triangle with hypotenuse**c�**A sufficient condition that a triangle**T�**be a right angled triangle is that**a2+b2=c2�2+�2=�2**.An equivalent statement is**
   1. If T is a right angled triangle then a2+b2=c2�2+�2=�2
   2. If a2+b2=c2�2+�2=�2 then T is a right triangle.
   3. a2+b2≠c2�2+�2≠�2Then T is not a right triangle.
   4. T is a right triangle only if a2+b2=c2�2+�2=�2

Show Answer

**Answer :**     Option ( b )

1. **Let P:**R2−5=10�2-5=10 **Q:**R2−5=20�2-5=20 **And consider the following flow chart of a computer program  
   Then the value of S is**

[](https://blogger.googleusercontent.com/img/a/AVvXsEhizKuq5-YI7b4h21Ezxt4lHcZqGZW2LG1c_Wm_JymPrZ7YISV-r5OwtFryhAahsonhYEY9LlqAEozGfm8B9M0qUCIPWzkb8i-I6yoR47LfnJiE8GPsDiIDswEScOwYn84QifU0As3ivmIsf_uXt2KsnqWt7thRWcdQTnmIZLDXaCVX0SfPT71tNBWOLw=s622)

* 1. 30
  2. 25
  3. 0
  4. 10

Show Answer

**Answer :**     Option ( c )

1. **Which one of the following is the most appropriate logical formula to represent the statement? “Students who know Mathematical , coding skills are placed”.**

 The following notations are used:

M(x): x is knowing the Mathematical skills

C(x): x is knowing the Coding skills P(x): x is placed

* 1. ∀x (P (x )→ (M (x )∧C(x)))
  2. ∀x((M(x)∧C (x ))→P (x ))
  3. Ǝx((M(x)∧C (x ))→P (x )
  4. ∀x((M(x)∨C (x ) )→P (x ))

Show Answer

**Answer :**     Option ( d )

1. **P and Q are two propositions. Which of the following logical expressions are equivalent?**

 p∨~Q�∨~�  
~(~P∧Q)~(~�∧�)  
(P∧Q)∨(P∧~Q)∨(~P∧~Q)(�∧�)∨(�∧~�)∨(~�∧~�)  
(P∧Q)∨(P∧~Q)∨(~P∧Q)(�∧�)∨(�∧~�)∨(~�∧�)

* 1. Only I and II
  2. Only I, II and III
  3. Only I, II and IV
  4. All of I, II, III and IV

Show Answer

**Answer :**     Option ( b )

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1. How many even 4 digit whole numbers are there?  
a) 1358  
b) 7250  
c) 4500  
d) 3600  
View Answer

Answer: c  
Explanation: The thousands digit cannot be zero, so there are 9 choices. There are 10 possibilities for the hundreds digit and 10 possibilities for the tens digit. The units digit can be 0, 2, 4, 6 or 8, so there are 5 choices. By the basic counting principle, the number of even five digit whole numbers is 9 × 10 × 10 × 5 = 45,00.

2. In a multiple-choice question paper of 15 questions, the answers can be A, B, C or D. The number of different ways of answering the question paper are \_\_\_\_\_\_\_\_  
a) 65536 x 47  
b) 194536 x 45  
c) 23650 x 49  
d) 11287435  
View Answer

Answer: a  
Explanation: There are 415 = 65536 x 47 different ways of answering the exam paper of 15 MCQs.

3. How many words with seven letters are there that start with a vowel and end with an A? Note that they don’t have to be real words and letters can be repeated.  
a) 45087902  
b) 64387659  
c) 12765800  
d) 59406880  
View Answer

Answer: d  
Explanation: The first letter must be a vowel, so there are 5 choices. The second letter can be any one of 26, the third letter can be any one of 26, the fourth letter can be any one of 26 and fifth and sixth letters can be any of 26 choices. The last letter must be an A, so there is only 1 choice. By the basic counting principle, the number of ‘words’ is 5 × 26 × 26 × 26 × 26 × 26 × 1 = 59406880.

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4. Neela has twelve different skirts, ten different tops, eight different pairs of shoes, three different necklaces and five different bracelets. In how many ways can Neela dress up?  
a) 50057  
b) 14400  
c) 34870  
d) 56732  
View Answer

Answer: b  
Explanation: By the basic counting principle, the number of different ways = 12 × 10 × 8 × 3 × 5 = 14400. Note that shoes come in pairs. So she must choose one pair of shoes from ten pairs, not one shoe from twenty.

5. How many five-digit numbers can be made from the digits 1 to 7 if repetition is allowed?  
a) 16807  
b) 54629  
c) 23467  
d) 32354  
View Answer

Answer: a  
Explanation: 75 = 16807 ways of making the numbers consisting of five digits if repetition is allowed.

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6. For her English literature course, Ruchika has to choose one novel to study from a list of ten, one poem from a list of fifteen and one short story from a list of seven. How many different choices does Rachel have?  
a) 34900  
b) 26500  
c) 12000  
d) 10500  
View Answer

Answer: d  
Explanation: By the Basic Counting Principle, the number of different choices is 10 × 15 × 7 = 10500.

7. There are two different Geography books, five different Natural Sciences books, three different History books and four different Mathematics books on a shelf. In how many different ways can they be arranged if all the books of the same subjects stand together?  
a) 353450  
b) 638364  
c) 829440  
d) 768700  
View Answer

Answer: c  
Explanation: There are four groups of books which can be arranged in 4! different ways. Among those books, two are Geography books, five are Natural Sciences books, three are History books and four are Mathematics books. Therefore, there are 4! × 2! × 5! × 3! × 4! = 829440 ways to arrange the books.

8. The code for a safe is of the form PPPQQQQ where P is any number from 0 to 9 and Q represents the letters of the alphabet. How many codes are possible for each of the following cases? Note that the digits and letters of the alphabet can be repeated.  
a) 874261140  
b) 537856330  
c) 549872700  
d) 456976000  
View Answer

Answer: d  
Explanation: 103 × 264 = 456976000 possible codes are formed for the safe with the alphanumeric digits.

9. Amit must choose a seven-digit PIN number and each digit can be chosen from 0 to 9. How many different possible PIN numbers can Amit choose?  
a) 10000000  
b) 9900000  
c) 67285000  
d) 39654900  
View Answer

Answer: a  
Explanation: By the basic counting principle, the total number of PIN numbers Amit can choose is 10 × 10 × 10 × 10 × 10 × 10 × 10 = 10,000000.

10. A head boy, two deputy head boys, a head girl and 3 deputy head girls must be chosen out of a student council consisting of 14 girls and 16 boys. In how many ways can they are chosen?  
a) 98072  
b) 27384  
c) 36428  
d) 44389  
View Answer

Answer: b  
Explanation: There are 16 × 15 × 14 + 14 × 13 × 12 × 11 = 27384 ways to choose from a student council.

1. Let P (x) denote the statement “x >7.” Which of these have truth value true?  
a) P (0)  
b) P (4)  
c) P (6)  
d) P (9)  
View Answer

Answer: d  
Explanation: Put x=9, 9>7 which is true.

2. Let Q(x) be the statement “x < 5.” What is the truth value of the quantification ∀xQ(x), having domains as real numbers.  
a) True  
b) False  
View Answer

Answer: b  
Explanation: Q(x) is not true for every real number x, because, for instance, Q(6) is false. That is, x = 6 is a counterexample for the statement ∀xQ(x). This is false.

3. Determine the truth value of ∀n(n + 1 > n) if the domain consists of all real numbers.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: There are no elements in the domain for which the statement is false.

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4. Let P(x) denote the statement “x = x + 7.” What is the truth value of the quantification ∃xP(x), where the domain consists of all real numbers?  
a) True  
b) False  
View Answer

Answer: b  
Explanation: Because P(x) is false for every real number x, the existential quantification of Q(x), which is ∃xP(x), is false.

5. Let R (x) denote the statement “x > 2.” What is the truth value of the quantification ∃xR(x), having domain as real numbers?  
a) True  
b) False  
View Answer

Answer: a  
Explanation: Because “x > 2” is sometimes true—for instance, when x = 3–the existential quantification of R(x), which is ∃xR(x), is true.

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6. The statement,” Every comedian is funny” where C(x) is “x is a comedian” and F (x) is “x is funny” and the domain consists of all people.  
a) ∃x(C(x) ∧ F (x))  
b) ∀x(C(x) ∧ F (x))  
c) ∃x(C(x) → F (x))  
d) ∀x(C(x) → F (x))  
View Answer

Answer: d  
Explanation: For every person x, if comedian then x is funny.

7. The statement, “At least one of your friends is perfect”. Let P (x) be “x is perfect” and let F (x) be “x is your friend” and let the domain be all people.  
a) ∀x (F (x) → P (x))  
b) ∀x (F (x) ∧ P (x))  
c) ∃x (F (x) ∧ P (x))  
d) ∃x (F (x) → P (x))  
View Answer

Answer: c  
Explanation: For some x, x is friend and funny.

8. ”Everyone wants to learn cosmology.” This argument may be true for which domains?  
a) All students in your cosmology class  
b) All the cosmology learning students in the world  
c) Both of the mentioned  
d) None of the mentioned  
View Answer

Answer: c  
Explanation: Domain may be limited to your class or may be whole world both are good as it satisfies universal quantifier.

9. Let domain of m includes all students, P (m) be the statement “m spends more than 2 hours in playing polo”. Express ∀m ¬P (m) quantification in English.  
a) A student is there who spends more than 2 hours in playing polo  
b) There is a student who does not spend more than 2 hours in playing polo  
c) All students spends more than 2 hours in playing polo  
d) No student spends more than 2 hours in playing polo  
View Answer

Answer: d  
Explanation: There is no student who spends more than 2 hours in playing polo.

10. Determine the truth value of statement ∃n (4n = 3n) if the domain consists of all integers.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: For n=0, 4n=3n hence, it is true.

1. Let the statement be “If n is not an odd integer then square of n is not odd.”, then if P(n) is “n is an not an odd integer” and Q(n) is “(square of n) is not odd.” For direct proof we should prove \_\_\_\_\_\_\_\_\_  
a) ∀nP ((n) → Q(n))  
b) ∃ nP ((n) → Q(n))  
c) ∀n~(P ((n)) → Q(n))  
d) ∀nP ((n) → ~(Q(n)))  
View Answer

Answer: a  
Explanation: Definition of direct proof.

2. Which of the following can only be used in disproving the statements?  
a) Direct proof  
b) Contrapositive proofs  
c) Counter Example  
d) Mathematical Induction  
View Answer

Answer: c  
Explanation: Counter examples cannot be used to prove results.

3. Let the statement be “If n is not an odd integer then sum of n with some not odd number will not be odd.”, then if P(n) is “n is an not an odd integer” and Q(n) is “sum of n with some not odd number will not be odd.” A proof by contraposition will be \_\_\_\_\_\_\_\_  
a) ∀nP ((n) → Q(n))  
b) ∃ nP ((n) → Q(n))  
c) ∀n~(P ((n)) → Q(n))  
d) ∀n(~Q ((n)) → ~(P(n)))  
View Answer

Answer: d  
Explanation: Definition of proof by contraposition.

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4. When to proof P→Q true, we proof P false, that type of proof is known as \_\_\_\_\_\_\_\_\_\_\_  
a) Direct proof  
b) Contrapositive proofs  
c) Vacuous proof  
d) Mathematical Induction  
View Answer

Answer: c  
Explanation: Definition of vacuous proof.

5. In proving √5 as irrational, we begin with assumption √5 is rational in which type of proof?  
a) Direct proof  
b) Proof by Contradiction  
c) Vacuous proof  
d) Mathematical Induction  
View Answer

Answer: b  
Explanation: Definition of proof by contradiction.

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6. A proof covering all the possible cases, such type of proofs are known as \_\_\_\_\_\_\_\_\_\_\_  
a) Direct proof  
b) Proof by Contradiction  
c) Vacuous proof  
d) Exhaustive proof  
View Answer

Answer: d  
Explanation: Definition of exhaustive proof.

7. Which of the arguments is not valid in proving sum of two odd number is not odd.  
a) 3 + 3 = 6, hence true for all  
b) 2n +1 + 2m +1 = 2(n+m+1) hence true for all  
c) All of the mentioned  
d) None of the mentioned  
View Answer

Answer: a  
Explanation: Some examples are not valid in proving results.

8. A proof broken into distinct cases, where these cases cover all prospects, such proofs are known as \_\_\_\_\_\_\_\_\_\_\_  
a) Direct proof  
b) Contrapositive proofs  
c) Vacuous proof  
d) Proof by cases  
View Answer

Answer: c  
Explanation: Definition of proof by cases.

9. A proof that p → q is true based on the fact that q is true, such proofs are known as \_\_\_\_\_\_\_\_\_\_\_  
a) Direct proof  
b) Contrapositive proofs  
c) Trivial proof  
d) Proof by cases  
View Answer

Answer: c  
Explanation: Definition of trivial proof.

10. A theorem used to prove other theorems is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Lemma  
b) Corollary  
c) Conjecture  
d) None of the mentioned  
View Answer

Answer: a  
Explanation: Definition of lemma.

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This set of Discrete Mathematics Multiple Choice Questions & Answers (MCQs) focuses on “Logics – Propositions”.

1. Which of the following statement is a proposition?  
a) Get me a glass of milkshake  
b) God bless you!  
c) What is the time now?  
d) The only odd prime number is 2  
View Answer

Answer: d  
Explanation: Only this statement has got the truth value which is false.

2. The truth value of ‘4+3=7 or 5 is not prime’.  
a) False  
b) True  
View Answer

Answer: b  
Explanation: Compound statement with ‘or’ is true when either of the statement is true. Here the first part of the statement is true, hence the whole is true.

3. Which of the following option is true?  
a) If the Sun is a planet, elephants will fly  
b) 3 +2 = 8 if 5-2 = 7  
c) 1 > 3 and 3 is a positive integer  
d) -2 > 3 or 3 is a negative integer  
View Answer

Answer: a  
Explanation: Hypothesis is false, thus the whole statement is true.

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4. What is the value of x after this statement, assuming the initial value of x is 5?  
**‘If x equals to one then x=x+2 else x=0’.**  
a) 1  
b) 3  
c) 0  
d) 2  
View Answer

Answer: c  
Explanation: If condition is false so value decided according to else condition.

5. Let P: I am in Bangalore.; Q: I love cricket.; then q -> p(q implies p) is?  
a) If I love cricket then I am in Bangalore  
b) If I am in Bangalore then I love cricket  
c) I am not in Bangalore  
d) I love cricket  
View Answer

Answer: a  
Explanation: Q is hypothesis and P is conclusion. So the compound statement will be if hypothesis then conclusion.

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6. Let P: If Sahil bowls, Saurabh hits a century.; Q: If Raju bowls, Sahil gets out on first ball. Now if P is true and Q is false then which of the following can be true?  
a) Raju bowled and Sahil got out on first ball  
b) Raju did not bowled  
c) Sahil bowled and Saurabh hits a century  
d) Sahil bowled and Saurabh got out  
View Answer

Answer: c  
Explanation: Either hypothesis should be false or both (hypothesis and conclusion) should be true.

7. The truth value ‘9 is prime then 3 is even’.  
a) False  
b) True  
View Answer

Answer: b  
Explanation: The first part of the statement is false, hence whole is true.

8. Let P: I am in Delhi.; Q: Delhi is clean.; then q ^ p(q and p) is?  
a) Delhi is clean and I am in Delhi  
b) Delhi is not clean or I am in Delhi  
c) I am in Delhi and Delhi is not clean  
d) Delhi is clean but I am in Mumbai  
View Answer

Answer: a  
Explanation: Connector should be ‘and’, that is q and p.

9. Let P: This is a great website, Q: You should not come back here. Then ‘This is a great website and you should come back here.’ is best represented by?  
a) ~P V ~Q  
b) P ∧ ~Q  
c) P V Q  
d) P ∧ Q  
View Answer

Answer: b  
Explanation: The second part of the statement is negated, hence negation operator is used.

10. Let P: We should be honest., Q: We should be dedicated., R: We should be overconfident. Then ‘We should be honest or dedicated but not overconfident.’ is best represented by?  
a) ~P V ~Q V R  
b) P ∧ ~Q ∧ R  
c) P V Q ∧ R  
d) P V Q ∧ ~R  
View Answer

Answer: d  
Explanation: The third part of the statement is negated, hence negation operator is used, for (‘or’ –V) is used and for(’but’- ∧).

1. Consider the recurrence relation a1=4, an=5n+an-1. The value of a64 is \_\_\_\_\_\_\_\_\_  
a) 10399  
b) 23760  
c) 75100  
d) 53700  
View Answer

Answer: a  
Explanation: an=5n+an-1  
= 5n + 5(n-1) + … + an-2  
= 5n + 5(n-1) + 5(n − 2) +…+ a1  
= 5n + 5(n-1) + 5(n − 2) +…+ 4 [since, a1=4]  
= 5n + 5(n-1) + 5(n − 2) +…+ 5.1 – 1  
= 5(n + (n − 1)+…+2 + 1) – 1  
= 5 \* n(n+1)/ 2 – 1  
an = 5 \* n(n+1)/ 2 – 1  
Now, n=64 so the answer is a64 = 10399.

2. Determine the solution of the recurrence relation Fn=20Fn-1 − 25Fn-2 where F0=4 and F1=14.  
a) an = 14\*5n-1  
b) an = 7/2\*2n−1/2\*6n  
c) an = 7/2\*2n−3/4\*6n+1  
d) an = 3\*2n−1/2\*3n  
View Answer

Answer: b  
Explanation: The characteristic equation of the recurrence relation is → x2−20x+36=0  
So, (x-2)(x-18)=0. Hence, there are two real roots x1=2 and x2=18. Therefore the solution to the recurrence relation will have the form: an=a2n+b18n. To find a and b, set n=0 and n=1 to get a system of two equations with two unknowns: 4=a20+b180=a+b and 3=a21+b61=2a+6b. Solving this system gives b=-1/2 and a=7/2. So the solution to the recurrence relation is,  
an = 7/2\*2n−1/2\*6n.

3. What is the recurrence relation for 1, 7, 31, 127, 499?  
a) bn+1=5bn-1+3  
b) bn=4bn+7!  
c) bn=4bn-1+3  
d) bn=bn-1+1  
View Answer

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4. If Sn=4Sn-1+12n, where S0=6 and S1=7, find the solution for the recurrence relation.  
a) an=7(2n)−29/6n6n  
b) an=6(6n)+6/7n6n  
c) an=6(3n+1)−5n  
d) an=nn−2/6n6n  
View Answer

Answer: b  
Explanation: The characteristic equation of the recurrence relation is → x2−4x-12=0  
So, (x-6)(x+2)=0. Only the characteristic root is 6. Therefore the solution to the recurrence relation will have the form: an=a.6n+b.n.6n. To find a and b, set n=0 and n=1 to get a system of two equations with two unknowns: 6=a60+b.0.60=a and 7=a61+b.1.61=2a+6b. Solving this system gives a=6 and b=6/7. So the solution to the recurrence relation is, an=6(6n)−6/7n6n.

5. Find the value of a4 for the recurrence relation an=2an-1+3, with a0=6.  
a) 320  
b) 221  
c) 141  
d) 65  
View Answer

Answer: c  
Explanation: When n=1, a1=2a0+3, Now a2=2a1+3. By substitution, we get a2=2(2a0+3)+3.  
Regrouping the terms, we get a4=141, where a0=6.

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6. The solution to the recurrence relation an=an-1+2n, with initial term a0=2 are \_\_\_\_\_\_\_\_\_  
a) 4n+7  
b) 2(1+n)  
c) 3n2  
d) 5\*(n+1)/2  
View Answer

Answer: b  
Explanation: When n=1, a1=a0+2. By substitution we get, a2=a1+2 ⇒ a2=(a0+2)+2 and so on. So the solution to the recurrence relation, subject to the initial condition should be an=2+2n=2(1+n).

7. Determine the solution for the recurrence relation bn=8bn-1−12bn-2 with b0=3 and b1=4.  
a) 7/2\*2n−1/2\*6n  
b) 2/3\*7n-5\*4n  
c) 4!\*6n  
d) 2/8n  
View Answer

Answer: a  
Explanation: Rewrite the recurrence relation bn-8bn-1+12bn-2=0. Now from the characteristic equation: x2−8x+12=0 we have x: (x−2)(x−6)=0, so x=2 and x=6 are the characteristic roots. Therefore the solution to the recurrence relation will have the form: bn=b2n+c6n. To find b and c, set n=0 and n=1 to get a system of two equations with two unknowns: 3=b20+c60=b+c, and 4=b21+c61=2b+6c. Solving this system gives c=-1/2 and b=7/2. So the solution to the recurrence relation is, bn=7/2\*2n−1/2\*6n.

8. What is the solution to the recurrence relation an=5an-1+6an-2?  
a) 2n2  
b) 6n  
c) (3/2)n  
d) n!\*3  
View Answer

Answer: b  
Explanation: Check for the left side of the equation with all the options into the recurrence relation. Then, we get that 6n is the required solution to the recurrence relation an=5an-1 + 6an-2.

9. Determine the value of a2 for the recurrence relation an = 17an-1 + 30n with a0=3.  
a) 4387  
b) 5484  
c) 238  
d) 1437  
View Answer

Answer: d  
Explanation: When n=1, a1=17a0+30, Now a2=17a1+30\*2. By substitution, we get a2=17(17a0+30)+60. Then regrouping the terms, we get a2=1437, where a0=3.

10. Determine the solution for the recurrence relation an = 6an-1−8an-2 provided initial conditions a0=3 and a1=5.  
a) an = 4 \* 2n – 3n  
b) an = 3 \* 7n – 5\*3n  
c) an = 5 \* 7n  
d) an = 3! \* 5n  
View Answer

Answer: b  
Explanation: The characteristic polynomial is x2−6x+8. By solving the characteristic equation, x2−6x+8=0 we get x=2 and x=4, these are the characteristic roots. Therefore we know that the solution to the recurrence relation has the form an=a\*2n+b\*4n, for some constants a and b. Now, by using the initial conditions a0 and a1 we have: a=7/2 and b=-1/2. Therefore the solution to the recurrence relation is: an = 4 \* 2n – 1\*3n = 7/2 \* 2n – 1/2\*3n.