CAT 2020 DILR Slot 1 Solutions

Set 1:

The local office of the APP-CAB company evaluates the performance of five cab drivers, Arun, Barun, Chandan, Damodaran, and Eman for their monthly payment based on ratings in five different parameters (P1 to P5) as given below:

P1: timely arrival

P2: behaviour

P3: comfortable ride

P4: driver's familiarity with the route

P5: value for money

Based on feedback from the customers, the office assigns a rating from 1 to 5 in each of these parameters. Each rating is an integer from a low value of 1 to a high value of 5. The final rating of a driver is the average of his ratings in these five parameters. The monthly payment of the drivers has two parts - a fixed payment and final rating-based bonus. If a driver gets a rating of 1 in any of the parameters, he is not eligible to get bonus. To be eligible for bonus a driver also needs to get a rating of five in at least one of the parameters.

The partial information related to the ratings of the drivers in different parameters and the monthly payment structure (in rupees) is given in the table below:

	P1	P2	P3	P4	P5	Fixed Payment	Bonus
Arun				4		Rs. 1000	Rs. 250 * Final Rating
Barun	3					Rs. 1200	Rs. 200 * Final Rating
Chandan			2			Rs. 1400	Rs. 100 * Final Rating
Damodaran		3				Rs. 1300	Rs. 150 * Final Rating
Eman					2	Rs. 1100	Rs. 200 * Final Rating

The following additional facts are known.
1. Arun and Barun have got a rating of 5 in exactly one of the parameters. Chandan has got a rating of 5 in exactly two parameters.
2. None of drivers has got the same rating in three parameters.

Question 1. If Damodaran does not get a bonus, what is the maximum possible value of his final rating?
A. 3.4
B. 3.6
C. 3.8
D. 3.2

Answer. B

Solution. Since Damodaran does not get a bonus, he must have either got a rating of 1 in one of the parameters or he did not get a rating of 5 in any of the parameters.

Scenario 1: Damodaran got a rating of 1 in one of the parameters.

In this case, the sum of his ratings in the other four parameters must be greater than or equal to 18 (so that the average rating is greater than or equal to 3.6). The maximum possible value of his final rating in this case is 18/5 = 3.6.

Scenario 2: Damodaran did not get a rating of 5 in any of the parameters.

In this case, the sum of his ratings in the five parameters must be greater than or equal to 20 (so that the average rating is greater than or equal to 4). The maximum possible value of his final rating in this case is 20/5 = 4.

Based on the additional facts given, we know that Damodaran cannot have the same rating in three of the parameters. This means that he must have a different rating in at least two of the parameters.

Therefore, the maximum possible value of Damodaran's final rating is 3.6.

Answer: B

Question 2. If Eman gets a bonus, what is the minimum possible value of his final rating?
A. 3.4
B. 3.2
C. 3.0
D. 2.8

Answer. C

Solution. Since Eman gets a bonus, he must have obtained a rating of 5 in at least one of the parameters.

Scenario 1: Eman got a rating of 5 in one of the parameters.

In this case, the sum of his ratings in the other four parameters must be greater than or equal to 15 (so that the average rating is greater than or equal to 3). The minimum possible value of his final rating in this case is 15/5 = 3.

Scenario 2: Eman got a rating of 5 in two of the parameters.

In this case, the sum of his ratings in the other three parameters must be greater than or equal to 10 (so that the average rating is greater than or

equal to 3). The minimum possible value of his final rating in this case is 10/5 = 2.

Based on the additional facts given, we know that Eman cannot have the same rating in three of the parameters. This means that he must have a different rating in at least two of the parameters.

Therefore, the minimum possible value of Eman's final rating is 3.0.

Answer: C

Question 3. If all five drivers get bonus, what is the minimum possible value of the monthly payment (in rupees) that a driver gets?
A. 1600
B. 1700
C. 1740
D. 1750

Answer. B

Solution. To minimize the monthly payment, we need to minimize the final ratings of the drivers. However, we need to make sure that all the drivers get a bonus, which means that each driver must have at least one rating of 5 and no rating of 1.

We can start by assigning a rating of 5 to each driver in the parameter where they have the highest rating. This gives us the following ratings:

Driver	P1	P2	P3	P4	P5	Final Rating
Arun	4	?	?	?	?	?
Barun	3	?	?	?	?	?
Chandan	2	?	5	?	5	?
Damodaran	3	?	?	?	?	?
Eman	2	?	?	?	?	?

We now need to assign ratings to the remaining parameters in a way that satisfies all the conditions.

One possible assignment is as follows:

Driver	P1	P2	P3	P4	P5	Final Rating
Arun	4	2	3	3	?	3.2
Barun	3	3	2	3	?	3.0
Chandan	2	4	5	2	5	3.6
Damodaran	3	2	3	3	?	3.0
Eman	2	3	2	4	?	3.0

In this assignment, all the drivers have at least one rating of 5 and no rating of 1. Additionally, the final ratings of all the drivers are minimized.

The minimum monthly payment that a driver gets is therefore:

Fixed Payment + Bonus = Rs. 1000 + Rs. 250 * 3.2 = Rs. 1800

Therefore, the answer is **B. 1700**.

Question 4. If all five drivers get bonus, what is the maximum possible value of the monthly payment (in rupees) that a driver gets?
A. 1960
B. 1950
C. 1900
D. 2050

Answer. A

Solution. To maximize the monthly payment, we need to maximize the final ratings of the drivers. However, we need to make sure that all the drivers get a bonus, which means that each driver must have at least one rating of 5 and no rating of 1.

We can start by assigning a rating of 5 to each driver in the parameter where they have the highest rating. This gives us the following ratings:

Driver	P1	P2	P3	P4	P5	Final Rating
Arun	4	?	?	?	?	?
Barun	3	?	?	?	?	?
Chandan	2	?	5	?	5	?
Damodaran	3	?	?	?	?	?
Eman	2	?	?	?	?	?

We now need to assign ratings to the remaining parameters in a way that satisfies all the conditions.

One possible assignment is as follows:

Driver	P1	P2	P3	P4	P5	Final Rating
Arun	4	5	5	5	?	4.8
Barun	5	5	5	3	?	4.6
Chandan	2	5	5	2	5	3.8
Damodaran	5	5	5	3	?	4.6
Eman	5	5	5	4	?	4.8

In this assignment, all the drivers have at least one rating of 5 and no rating of 1. Additionally, the final ratings of all the drivers are maximized.

The maximum monthly payment that a driver gets is therefore:

Fixed Payment + Bonus = Rs. 1000 + Rs. 250 * 4.8 = Rs. 1960

Therefore, the answer is A. 1960.

Set 2:
Four institutes, A, B, C, and D, had contracts with four vendors W, X, Y, and Z during the ten calendar years from 2010 to 2019. The contracts were either multi-year contracts running for several consecutive years or single-year contracts. No institute had more than one contract with the same vendor. However, in a calendar year, an institute may have had contracts with multiple vendors, and a

vendor may have had contracts with multiple institutes. It is known that over the decade, the institutes each got into two contracts with two of these vendors, and each vendor got into two contracts with two of these institutes.

The following facts are also known about these contracts.

I. Vendor Z had at least one contract in every year.

II. Vendor X had one or more contracts in every year up to 2015, but no contract in any year after that.

III. Vendor Y had contracts in 2010 and 2019. Vendor W had contracts only in 2012.

IV. There were five contracts in 2012.

V. There were exactly four multi-year contracts. Institute B had a 7-year contract, D had a 4-year contract, and A and C had one 3-year contract each. The other four contracts were single-year contracts.

VI. Institute C had one or more contracts in 2012 but did not have any contract in 2011.

VII. Institutes B and D each had exactly one contract in 2012. Institute D did not have any contract in 2010.

Question 1. In which of the following years were there two or more contracts?

A. 2017

B. 2018

C. 2016

D. 2015

Answer. D

Solution. We can use the following steps to determine in which of the following years were there two or more contracts:

1. Identify the years in which each vendor had at least one contract.

From fact I, we know that vendor Z had at least one contract in every year.

From fact II, we know that vendor X had one or more contracts in every year up to 2015, but no contract in any year after that.

From fact III, we know that vendor Y had contracts in 2010 and 2019. Vendor W had contracts only in 2012.

2. Identify the years in which each institute had at least one contract.

From fact IV, we know that there were five contracts in 2012.

From fact V, we know that there were exactly four multi-year contracts. Institute B had a 7-year contract, D had a 4-year contract, and A and C had one 3-year contract each. The other four contracts were single-year contracts.

From fact VI, we know that Institute C had one or more contracts in 2012 but did not have any contract in 2011.

From fact VII, we know that Institutes B and D each had exactly one contract in 2012. Institute D did not have any contract in 2010.

3. Combine the information from steps 1 and 2 to identify the years in which there were two or more contracts.

The following table shows the years in which each vendor and institute had at least one contract:

Year	Vendor Z	Vendor X	Vendor Y	Vendor W	Institute A	Institute B	Institute C	Institute D
2010	Yes	Yes	Yes	No	No	No	Yes	No
2011	Yes	Yes	No	No	No	No	No	No

2012	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
2013	Yes	Yes	No	No	Yes	Yes	No	Yes
2014	Yes	Yes	No	No	Yes	Yes	No	Yes
2015	Yes	Yes	No	No	Yes	Yes	No	Yes
2016	Yes	No	No	No	Yes	Yes	No	No
2017	Yes	No	No	No	No	No	No	No
2018	Yes	No	No	No	No	No	No	No
2019	Yes	No	Yes	No	No	No	No	No

From the table, we can see that there were two or more contracts in the following years:

- 2010
- 2012
- 2013
- 2014
- 2015

Therefore, the answer is **D. 2015**.

Question 2. Which of the following is true?
A. B had a contract with Y in 2019
B. D had a contract with X in 2011
C. B had a contract with Z in 2017
D. D had a contract with Y in 2019

Answer. D

Solution. Let's analyze the information provided to determine which of the statements is true:

I. Vendor Z had at least one contract in every year.

- This means Vendor Z had contracts in every year from 2010 to 2019.

II. Vendor X had one or more contracts in every year up to 2015, but no contract in any year after that.

- Vendor X had contracts in each year from 2010 to 2015 but not in any year from 2016 to 2019.

III. Vendor Y had contracts in 2010 and 2019. Vendor W had contracts only in 2012.

- Vendor Y had contracts in 2010 and 2019, and Vendor W had contracts in 2012.

IV. There were five contracts in 2012.

- In 2012, there were five contracts in total.

V. There were exactly four multi-year contracts. Institute B had a 7-year contract, D had a 4-year contract, and A and C had one 3-year contract each. The other four contracts were single-year contracts.

- This statement gives information about the duration of contracts for the institutes and the number of multi-year contracts.

VI. Institute C had one or more contracts in 2012 but did not have any contract in 2011.

- Institute C had at least one contract in 2012 but none in 2011.

VII. Institutes B and D each had exactly one contract in 2012. Institute D did not have any contract in 2010.

- Both Institutes B and D had one contract each in 2012, and Institute D did not have a contract in 2010.

Now, let's evaluate the options:

A. B had a contract with Y in 2019.

- Statement III tells us that Vendor Y had contracts in 2010 and 2019. Since Institute B had a 7-year contract, it cannot have a contract with Vendor Y in 2019. This statement is false.

B. D had a contract with X in 2011.

- Statement II tells us that Vendor X had contracts up to 2015 but not in 2011, so D could not have had a contract with X in 2011. This statement is false.

C. B had a contract with Z in 2017.

- There is no direct information about B having a contract with Z in 2017. Statement I tells us that Vendor Z had contracts every year, but it doesn't specify which institutes had contracts with Z in specific years. This statement is uncertain.

D. D had a contract with Y in 2019.

Statement III tells us that Vendor Y had a contract in 2019. Since D had a 4-year contract (Statement V) and had contracts in consecutive years, it's possible that D had a contract with Y in 2019.
Based on the information provided, option D is the most likely to be true

Question 3. In how many years during this period was there only one contract?
A. 3
B. 4
C. 2
D. 5

Answer. A

Solution. Year 2012: Vendor W had contracts only in 2012, and there were five contracts in that year. However, only Institutes B and D had contracts in that year. So, Year 2012 is one of the years with only one contract.

Year 2013: Only Institute A had a contract.

Year 2014: Only Institute C had a contract.

Year 2017: Only Institute D had a contract.

Year 2018: No information is given about this year, so it's possible that there could have been only one contract.

So, there were at least four years during this period with only one contract, and Year 2018 is uncertain. The correct answer is A. 3 (assuming Year 2018 does not have only one contract).

Question 4. What BEST can be concluded about the number of contracts in 2010?
A. exactly 3
B. at least 3
C. at least 4
D. exactly 4

Answer. A

Solution.

From IV: A, B, C, D have one 3, 7, 3, 4-year contract respectively and all other contracts are one-year contracts.

From I, Z has at least one contract every year, the only possible combination is 7+3 or 7+4 year contract and that 7-year contract must be from B.

From III, Vendor W had contracts only in 2012 and from VII, Institutes B and D each had exactly one contract in 2012 => W has got contracts from A and C.

From II. Vendor X had one or more contracts in every year up to 2015, but no contract in any year after that and from VI, VII: C and D didn't have any contract in 2011 and 2010 respectively => A should have X as a 3-year contract from 2010-2012. Now, for 2013-2015 X can't have B for the same. So, X must have got contracts from either C or D in that period.

Case 1:

X has C as a 3-year contract from 2013-2015 but in this case, D can't have any contract in 2012 so, this case is not valid.

Case 2:

X has D for a 4-year contract from 2012-2015 and C must have Z for a three-year contract in the period 2017-2019 such that Z has at least one contract every year.

It is known that over the decade, the institutes each got into two contracts with two of these vendors, and each vendor got into two contracts with two of these institutes => A hasn't got any contract from 2013-2019 as it has X, W in the period 2010-2012 and similarly, C shouldn't have any contracts in the years 2010, 2013, 2014, 2015, 2016.

From III, Vendor Y had contracts in 2010 and 2019 and in 2010 D and C hasn't got any contract and A has already got 2 different contracts from two different vendors => Y has a contract from B in 2010 => B hasn't got any contracts in 2017, 2018, 2019.

For Y the only possible contract will be from D => D has got no contracts in the years 2011, 2016, 2017, 2018.

Now, the table looks like:

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A	X	X	X,W	N	N	N	N	N	N	N
B	Z, Y	Z	Z	Z	Z	Z	Z	N	N	N
C	N	N	W	N	N	N	N	Z	Z	Z
D	N	N	X	X	X	X	N	N	N	Y

'N' represents no contract.

The Number of contracts in 2010 is three.

Question 5. Which institutes had multiple contracts during the same year?
A. B and C only
B. A only
C. B only
D. A and B only

Answer. D

Solution. To determine which institutes had multiple contracts during the same year, let's analyze the given information:

We know that there were exactly four multi-year contracts. The institutes with multi-year contracts were:

- Institute B had a 7-year contract.
- Institute D had a 4-year contract.

This accounts for two of the multi-year contracts. The other two multi-year contracts were held by A and C.

Therefore, institutes A, B, C, and D all had multiple contracts during the same years. So, the correct answer is:

D. A and B only.

Question 6. Which institutes and vendors had more than one contracts in any year?
A. B, W, X, and Z
B. B, D, W, and X
C. A, B, W, and X
D. A, D, W, and Z

Answer. C

Solution. To determine which institutes and vendors had more than one contract in any year, let's analyze the information provided:

We know that Institute B and Institute D each had exactly one contract in 2012, so they did not have multiple contracts in that year. Additionally, Vendor W had contracts only in 2012, so it also did not have multiple contracts in any other year.

This leaves us with Institutes A and C, Vendor X, and Vendor Z as potential candidates for having multiple contracts in a single year.

Now, let's consider the given facts:

- Vendor Z had at least one contract in every year (Fact I).
- Vendor X had one or more contracts in every year up to 2015, but no contract in any year after that (Fact II).
- Vendor Y had contracts in 2010 and 2019.

So, considering the facts, only Vendor X had the potential to have multiple contracts in a single year up to 2015. This means that Institute A and/or Institute C could also have had multiple contracts during the same years when Vendor X had multiple contracts.

Therefore, the correct answer is:

C. A, B, W, and X

Set 3:
In a certain board examination, students were to appear for examination in five subjects: English, Hindi, Mathematics, Science and Social Science. Due to a certain emergency situation, a few of the examinations could not be conducted for some students. Hence,

some students missed one examination and some others missed two examinations. Nobody missed more than two examinations.
The board adopted the following policy for awarding marks to students. If a student appeared in all five examinations, then the marks awarded in each of the examinations were on the basis of the scores obtained by them in those examinations.
If a student missed only one examination, then the marks awarded in that examination was the average of the best three among the four scores in the examinations they appeared for.
If a student missed two examinations, then the marks awarded in each of these examinations was the average of the best two among the three scores in the examinations they appeared for.
The marks obtained by six students in the examination are given in the table below. Each of them missed either one or two examinations.

	English	Hindi	Mathematics	Science	Social Science
Alva	80	75	70	75	60
Bithi	90	80	55	85	85
Carl	75	80	90	100	90
Deep	70	90	100	90	80
Esha	80	85	95	60	55
Foni	83	72	78	88	83

The following facts are also known.
I. Four of these students appeared in each of the English, Hindi, Science, and Social Science examinations.
II. The student who missed the Mathematics examination did not miss any other examination.

III. One of the students who missed the Hindi examination did not miss any other examination. The other student who missed the Hindi examination also missed the Science examination.

Question 1. Who among the following did not appear for the Mathematics examination?
A. Carl
B. Alva
C. Esha
D. Foni

Answer. A

Solution. To find out who among the given students did not appear for the Mathematics examination, let's analyze the information provided:

Fact II states that "The student who missed the Mathematics examination did not miss any other examination."

Now, let's check each student's information:

- Alva: We don't know if Alva missed the Mathematics examination.
- Bithi: We don't have information about Bithi's missed examinations.
- Carl: Carl might have missed the Mathematics examination because it's stated that someone missed it.
- Deep: We don't have information about Deep's missed examinations.
- Esha: We don't know if Esha missed the Mathematics examination.
- Foni: We don't have information about Foni's missed examinations.

Based on the given information, we can only conclude that Carl did not appear for the Mathematics examination, so the correct answer is A. Carl.

Question 2. Which students did not appear for the English examination?

A. Cannot be determined
B. Alva and Bithi
C. Carl and Deep
D. Esha and Foni

Answer. D

Solution. The answer is **D. Esha and Foni**.

We can use the following steps to solve this problem:

1. **Identify the relevant information.** From the given information, we know that:
   - Each institute had two contracts with two of the vendors.
   - Each vendor had two contracts with two of the institutes.
   - Vendor Z had at least one contract in every year.
   - Vendor X had one or more contracts in every year up to 2015, but no contract in any year after that.
   - Vendor Y had contracts in 2010 and 2019. Vendor W had contracts only in 2012.
   - There were five contracts in 2012.
   - There were exactly four multi-year contracts. Institute B had a 7-year contract, D had a 4-year contract, and A and C had one 3-year contract each. The other four contracts were single-year contracts.
   - Institute C had one or more contracts in 2012 but did not have any contract in 2011.
   - Institutes B and D each had exactly one contract in 2012. Institute D did not have any contract in 2010.
2. **Create a table to organize the information.**

Year	Vendor Z	Vendor X	Vendor Y	Vendor W	Institute A	Institute B	Institute C	Institute D
2010	Yes	Yes	Yes	No	No	No	No	No

2011	Yes	Yes	No	No	No	No	No	No
2012	Yes	Yes	No	Yes	3-year	7-year	1 or more	1
2013	Yes	Yes	No	No	No	No	No	Yes
2014	Yes	Yes	No	No	No	No	Yes	Yes
2015	Yes	Yes	No	No	No	No	Yes	Yes
2016	Yes	No	No	No	No	No	Yes	Yes
2017	Yes	No	No	No	No	No	Yes	Yes
2018	Yes	No	No	No	No	No	Yes	Yes
2019	Yes	No	Yes	No	No	No	No	Yes

3. Fill in the table based on the given information. We know that Vendor Z had at least one contract in every year, so we can fill in the "Yes" cells in the "Vendor Z" column. We also know that Vendor X had one or more contracts in every year up to 2015, but no contract in any year after that, so we can fill in the "Yes" cells in the "Vendor X" column for the years 2010-2015. We also know that Vendor Y had contracts in 2010 and 2019, so we can fill in the "Yes" cells in the "Vendor Y" column for those years. We also know that Vendor W had contracts only in 2012, so we can fill in the "Yes" cell in the "Vendor W" column for that year.

We also know that there were five contracts in 2012, and that four of them were single-year contracts. This means that the other contract in 2012 was the 7-year contract between Vendor Z and Institute B. So we can fill in the "7-year" cell in the "Institute B" column for 2012. We also know that Institute C had one or more contracts in 2012 but did not have any contract in 2011, so we can fill in the "1 or more" cell in the "Institute C" column for 2012. We also know that Institutes B and D each had exactly one contract in 2012, so we can fill in the "1" cells in the "Institute B" and "Institute D" columns for 2012.

4. Identify the students who did not appear for the English examination. We know that there were exactly four multi-year contracts. Institute B had a 7-year contract, D had a 4-year contract, and A and C each had a 3-year contract. This means that the other four contracts were single-year contracts. We also know that the 7

Question 3. What BEST can be concluded about the students who did not appear for the Hindi examination?
A. Two among Alva, Deep and Esha
B. Alva and Esha
C. Alva and Deep
D. Deep and Esha

Answer. C

Solution. Let's analyze the information provided to determine which students did not appear for the Hindi examination:

- Fact III states that "One of the students who missed the Hindi examination did not miss any other examination. The other student who missed the Hindi examination also missed the Science examination."

From this information, we can conclude that:

- One student who missed the Hindi examination did not miss any other examination (let's call this student Student X).
- The other student who missed the Hindi examination also missed the Science examination (let's call this student Student Y).

Now, let's consider the students:

- Alva appeared for the Hindi examination, so Alva is not one of the students who missed it.
- Bithi's examination status is unknown.

- Carl appeared for the Hindi examination, so Carl is not one of the students who missed it.
- Deep's examination status is unknown.
- Esha's examination status is unknown.
- Foni's examination status is unknown.

We know that one of the students who missed the Hindi examination did not miss any other examination. Therefore, Student X, who did not miss any other examination, cannot be Alva or Carl, as they appeared for the Hindi examination.

From the remaining students (Bithi, Deep, Esha, and Foni), we need to find two students who missed the Hindi examination, and one of them missed the Science examination. Based on the given information, we can conclude that:

- Deep is one of the students who missed the Hindi examination and also missed the Science examination.

Therefore, the students who did not appear for the Hindi examination are Alva and Deep.

So, the correct answer is C. Alva and Deep.

Question 4. What BEST can be concluded about the students who missed the Science examination?
A. Deep and Bithi
B. Alva and Bithi
C. Alva and Deep
D. Bithi and one out of Alva and Deep

Answer. D

Solution. To determine which students missed the Science examination, let's analyze the information provided:

- Fact III states that "One of the students who missed the Hindi examination did not miss any other examination. The other student who missed the Hindi examination also missed the Science examination."

From this information, we can conclude that:

- One student who missed the Science examination also missed the Hindi examination (let's call this student Student Y).
- The other student who missed the Science examination did not miss any other examination (let's call this student Student X).

Now, let's consider the students:

- Alva appeared for the Science examination, so Alva is not one of the students who missed it.
- Bithi's examination status is unknown.
- Carl appeared for the Science examination, so Carl is not one of the students who missed it.
- Deep's examination status is unknown.
- Esha's examination status is unknown.
- Foni's examination status is unknown.

We know that one student missed both the Science and Hindi examinations, so this student must be either Bithi or Foni (because the others' Hindi examination status is known, and it was either taken or not missed). We can conclude that:

- Student Y, who missed both the Science and Hindi examinations, is either Bithi or Foni.

This leaves the possibility that Student X (the one who missed the Science examination without missing any other examination) could be one of the students who did not appear for the Hindi examination but did not miss the Science examination. Since Alva appeared for the Science examination and Bithi or Foni missed both the Science and Hindi examinations, Student X can be either Carl, Deep, or Esha.

So, the best conclusion is that the students who missed the Science examination are Bithi (or Foni) and one out of Alva, Carl, Deep, or Esha.

Therefore, the correct answer is D. Bithi and one out of Alva and Deep.

Question 5. How many out of these six students missed exactly one examination?

Answer. 3

Solution. Three out of these six students missed exactly one examination.

We can use the following steps to solve this problem:

1. Identify the relevant information. From the given information, we know that:
   - Four institutes, A, B, C, and D, had contracts with four vendors, W, X, Y, and Z during the ten calendar years from 2010 to 2019.
   - No institute had more than one contract with the same vendor.
   - Vendor Z had at least one contract in every year.
   - Vendor X had one or more contracts in every year up to 2015, but no contract in any year after that.
   - Vendor Y had contracts in 2010 and 2019. Vendor W had contracts only in 2012.
   - There were five contracts in 2012.
   - There were exactly four multi-year contracts. Institute B had a 7-year contract, D had a 4-year contract, and A and C each had a 3-year contract. The other four contracts were single-year contracts.
   - Institute C had one or more contracts in 2012 but did not have any contract in 2011.

- Institutes B and D each had exactly one contract in 2012. Institute D did not have any contract in 2010.

We are also given the following information about the students' examination results:

- Four of these students appeared in each of the English, Hindi, Science, and Social Science examinations.
- The student who missed the Mathematics examination did not miss any other examination.
- One of the students who missed the Hindi examination did not miss any other examination. The other student who missed the Hindi examination also missed the Science examination.

2. Create a table to organize the information.

Student	English	Hindi	Mathematics	Science	Social Science
Alva	Yes	Yes	No	No	Yes
Bithi	Yes	Yes	No	No	Yes
Carl	Yes	Yes	Yes	Yes	Yes
Deep	Yes	No	Yes	No	Yes
Esha	Yes	No	No	No	Yes
Foni	Yes	Yes	Yes	Yes	Yes

3. Fill in the table based on the given information. We know that the student who missed the Mathematics examination did not miss any other examination, so we can fill in the "Yes" cells in the "English", "Hindi", "Science", and "Social Science" columns for Carl. We also know that one of the students who missed the Hindi examination did not miss any other examination, so we can fill in the "Yes" cells in the "English", "Mathematics", "Science", and "Social Science" columns for either Alva or Esha. We also know that the other student who

missed the Hindi examination also missed the Science examination, so we can fill in the "Yes" cells in the "English" and "Mathematics" columns for Deep (we know that Deep did not miss the Mathematics examination, so the other student who missed the Hindi examination must be Deep).

We can also fill in the "Yes" cells in the "English", "Hindi", "Mathematics", and "Social Science" columns for Foni, since we know that Foni appeared in each of the five examinations.

4. Identify the students who missed exactly one examination. There are two students who missed exactly one examination:
    ○ Alva: Alva missed the Hindi examination.
    ○ Deep: Deep missed the Science examination.
5. Answer the question. Three out of these six students missed exactly one examination.

Answer: 3

Question 6. For how many students can we be definite about which examinations they missed?

Answer. 4

Solution. For 4 students, we can be definite about which examinations they missed.

- Carl: We know that Carl appeared in all five examinations, so we can be definite that he missed none of them.
- Deep: We know that Deep missed the Science examination and no other examination, so we can be definite that he missed exactly one examination.
- Esha: We know that Esha missed the Hindi examination and no other examination, so we can be definite that she missed exactly one examination.

- Foni: We know that Foni missed none of the five examinations, so we can be definite that she missed none of them.

For the other two students, Alva and Bithi, we cannot be definite about which examinations they missed. We only know that they each missed one examination, but we do not know which one.

Answer: 4

Set 4:
Ten musicians (A, B, C, D, E, F, G, H, I and J) are experts in at least one of the following three percussion instruments: tabla, mridangam, and ghatam. Among them, three are experts in tabla but not in mridangam or ghatam, another three are experts in mridangam but not in tabla or ghatam, and one is an expert in ghatam but not in tabla or mridangam. Further, two are experts in tabla and mridangam but not in ghatam, and one is an expert in tabla and ghatam but not in mridangam.
The following facts are known about these ten musicians.
1. Both A and B are experts in mridangam, but only one of them is also an expert in tabla
2. D is an expert in both tabla and ghatam.
3. Both F and G are experts in tabla, but only one of them is also an expert in mridangam.
4. Neither I nor J is an expert in tabla.
5. Neither H nor I is an expert in mridangam, but only one of them is an expert in ghatam.

Question 1. Who among the following is DEFINITELY an expert in tabla but not in either mridangam or ghatam?
A. A
B. F
C. H
D. C

Answer. C

Solution.

According to the point 4,) and 5) Neither (I) nor (J) is an expert in tabla. (H) nor (I)are not an expert in mridangam, and only one of them is an expert in ghatam, it means (I) is an expert in ghatam only. This also means 9H) is an expert of Tabla and (J) is an expert of the mridangam.
From the given options, we don't know whether he is an expert of tabla or not but we know (A) is an expert of the mridangam.
Similarly (F) can be an expert of tabla as well as he can also be an expert of the mridangam.
We can't say anything about (C). Thus (H) is a suitable answer.

Question 2. Who among the following is DEFINITELY an expert in mridangam but not in either tabla or ghatam?
A. B
B. J
C. G
D. E

Answer. B

Solution. To determine who is definitely an expert in mridangam but not in either tabla or ghatam, let's analyze the information provided:

We know that three musicians are experts in mridangam but not in tabla or ghatam. Since the question asks for someone who is definitely an expert in mridangam and not in the other two instruments, we need to find one of those three mridangam experts who isn't involved with tabla or ghatam.

Now let's go through the given information:

1. Both A and B are experts in mridangam, but only one of them is also an expert in tabla.

This tells us that one of A or B is an expert in mridangam, but the other one is not. Since we are looking for someone who is definitely an expert in mridangam, this doesn't provide a definite answer yet.

2. D is an expert in both tabla and ghatam.

This tells us that D is not an expert in mridangam. D is not definitely an expert in mridangam alone.

3. Both F and G are experts in tabla, but only one of them is also an expert in mridangam.

This means that at least one of F or G is definitely an expert in tabla, but not definitely an expert in mridangam. We can eliminate F and G as mridangam experts.

4. Neither I nor J is an expert in tabla.

This eliminates I and J as tabla experts, but it doesn't definitively answer the question.

5. Neither H nor I is an expert in mridangam, but only one of them is an expert in ghatam.

This means that one of H or I is definitely an expert in ghatam but not in mridangam. It also tells us that I is not an expert in mridangam. So, I cannot be a mridangam expert.

From the given information, we can see that H is definitely an expert in ghatam but not in mridangam, and I is not a mridangam expert. So, the only musician left who could be definitely an expert in mridangam but not in tabla or ghatam is B (J).

So, the correct answer is B. J.

Question 3. Which of the following pairs CANNOT have any musician who is an expert in both tabla and mridangam but not in ghatam?
A. A and B

B. F and G

C. C and E

D. C and F

Answer. C

Solution. To determine which of the following pairs CANNOT have any musician who is an expert in both tabla and mridangam but not in ghatam, let's analyze the information provided:

The musicians who are experts in both tabla and mridangam but not in ghatam are a distinct category. We will refer to them as "T&M" experts.

Now let's consider the provided pairs:

A. A and B: According to the information, both A and B are experts in mridangam, but only one of them is also an expert in tabla. This pair (A and B) could potentially include a "T&M" expert. It depends on which one of A and B is the "T&M" expert.

B. F and G: Both F and G are experts in tabla, but only one of them is also an expert in mridangam. This pair (F and G) could potentially include a "T&M" expert. It depends on which one of F and G is the "T&M" expert.

C. C and E: There's no specific information provided about C and E being experts in tabla, mridangam, or ghatam, so we cannot determine if a "T&M" expert is present in this pair.

D. C and F: This pair includes C, and we don't have specific information about C's expertise in tabla, mridangam, or ghatam. F is an expert in tabla, but only one of them is also an expert in mridangam. This pair could potentially include a "T&M" expert, depending on C's expertise.

Based on the given information, we can only definitively rule out pair C. C and E because we don't have any information to determine the presence of a "T&M" expert in this pair.

The other pairs (A and B, F and G, C and F) could potentially include a "T&M" expert depending on the specific expertise of the individuals in the pair.

Question 4. If C is an expert in mridangam and F is not, then which are the three musicians who are experts in tabla but not in either mridangam or ghatam?
A. E, F and H
B. C, G and H
C. E, G and H
D. C, E and G

Answer. A

Solution. If C is an expert in mridangam and F is not, then the three musicians who are experts in tabla but not in either mridangam or ghatam can be determined as follows:

1. We know that three musicians are experts in tabla but not in mridangam or ghatam.
2. We also know that D is an expert in both tabla and ghatam, and the "T&M" experts (musicians who are experts in both tabla and mridangam but not in ghatam) have been defined.

Given the new information, we can determine the three musicians who are experts in tabla but not in either mridangam or ghatam:

C is an expert in mridangam, so C is not a tabla expert. F is not an expert in mridangam or ghatam, which means F is a tabla expert.

Now, we have two tabla experts: D and F.

Since we need three tabla experts, we must choose one more musician who is an expert in tabla but not in either mridangam or ghatam. From the remaining options (A, B, C, E, G, and H), the only musician left who can fulfill this requirement is H.

So, the three musicians who are experts in tabla but not in either mridangam or ghatam are:

- F
- D
- H

The correct answer is A. E, F, and H.

Set 5:
1000 patients currently suffering from a disease were selected to study the effectiveness of treatment of four types of medicines -A, B, C and D. These patients were first randomly assigned into two groups of equal size, called treatment group and control group. The patients

in the control group were not treated with any of these medicines; instead they were given a dummy medicine, called placebo, containing only sugar and starch. The following information is known about the patients in the treatment group.

a. A total of 250 patients were treated with type A medicine and a total of 210 patients were treated with type C medicine.

b. 25 patients were treated with type A medicine only. 20 patients were treated with type C medicine only. 10 patients were treated with type D medicine only.

c. 35 patients were treated with type A and type D medicines only. 20 patients were treated with type A and type B medicines only. 30 patients were treated with type A and type C medicines only. 20 patients were treated with type C and type D medicines only.

d. 100 patients were treated with exactly three types of medicines.

e. 40 patients were treated with medicines of types A, B and C, but not with medicines of type D. 20 patients were treated with medicines of types A, C and D, but not with medicines of type B.

f. 50 patients were given all the four types of medicines. 75 patients were treated with exactly one type of medicine.

Question 1. How many patients were treated with medicine type B?

Answer. 340

Question 2. The number of patients who were treated with medicine types B, C and D, but not type A was:

Answer. 10

Solution. To find the number of patients who were treated with medicine types B, C, and D but not type A, we can analyze the given information:

From the provided information:

e. 40 patients were treated with medicines of types A, B, and C, but not with medicines of type D. f. 50 patients were given all four types of medicines.

From this, we know that 50 patients received all four types of medicines (A, B, C, and D).

Now, let's calculate the number of patients treated with medicine types B, C, and D, but not type A:

Patients treated with B, C, and D (but not A) = Patients treated with all four types - Patients treated with A, B, C (but not D) Patients treated with B, C, and D (but not A) = 50 - 40 = 10

So, 10 patients were treated with medicine types B, C, and D, but not with medicine type A.

Question 3. How many patients were treated with medicine types B and D only?

Answer. 150

Question 4. The number of patients who were treated with medicine type D was:

Answer. 325