CRITICAL REASONING AND SYSTEMS THINKING
ASSIGNMENT -1
UNIT1

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Class : S12[Artificial Intelligence and Machine Learning]

QUESTION 1: Table Analysis

Rank	Train City	Code	Passengers Number	% Change
8	Sacramento	SAC	1231	3.1
2	Reno	RNO	948	-0.7
12	Salt Lake City	SLT	1134	2.3
6	Glenwood Springs	GLN	1014	1.8
3	Denver	DEN	724	-1.2

The table above give information for 2013 on the total passengers for 5 train stations in the western United States. These stations were chosen because in 2013 they were among the most popular. The table also includes the percent increase and decrease from the previous year.

Consider the following statements and determine whether the statements are true or false based on the information provided by the table.

I. The percent of change in the passenger count from 2012 created the rank identifier for 2013.

II. The train station that has the median number of passengers also has the median rank.

III. Over 50 percent of the stations that experienced a percentage increase are in the state of Utah.

Possible Answers:

I. False
II. True
III. False

I. False
II. True
III. True

I. True
II. False
III. False

I. False
II. False
III. True

I. True
II. True
III. False

In option I: The percent of change in the passenger count from 2012 created the rank identifier for 2013.
Looking at the ranks, it is seen that rank 2 which is the highest given, belongs to Reno. Reno's station also had a percent decrease from the previous year. Therefore making this statement false.

In option II: The train station that has the median passengers also has the median rank.
Passenger counts were reorganized from lowest to highest is would look as follows,
724, 948, 1014, 1134, 1231
The ranks if ordered in this same way would be as follows,
2, 3, 6, 8, 12
The median occurs at the third entry which would be passenger count 1014 and rank 6. Both of these belong to the train station at Glenwood Springs. Therefore making this statement true.

In option III: Over 50 percent of the stations that experienced a percentage increase are in the state of Utah.
The stations that experienced a percentage increase belong to Glenwood Springs, Salt Lake City, and Sacramento. Glenwood Springs is a city in Colorado, Salt Lake City is a city in Utah, and Sacramento is a city in California. Only one station is in Utah therefore making this statement false.

Question 2 : Table Analysis

The table displays the academic class spread among Dawn County schools in 2005.

Academic Class List			
Academic Class	Schools Offering Class	% of Schools Offering	# Student Enrollment
AP English	4	50	467
English	6	75	700
Math	8	100	934
AP Calculus	4	50	467
Gym	5	63	588
Painting	2	25	233
Sculpting	1	13	121
Study Hall	5	63	588
French	4	50	467
Latin	3	38	355
German	4	50	467
Spanish	4	50	467

Based on the given information in the table, select the options that can be proven to be true.
I. No class is offered in less than one-third of the schools.
II. Every school in the district offers either Gym or at least one Art class (Painting or Sculpting).
III. Math is an academic class that is offered in all schools in Dawn County.
Possible Answers:
II. and III
III.
II.
I. and II.
I.

ANSWERS:
Correct Answers: III

In option I: No class is offered in less than one-third of the schools.
It is seen that Sculpting is offered in 13% of the schools which is less than 33% therefore sculpting is offered in less than one-third of the schools thus making the statement false.

In option II: Every school in the district offers either Gym or an Art class.
The table states that 5 schools offer Gym and a total of three schools offer Art (Painting or Sculpting). This makes a total of 8 schools but it is unknown if there are 8 different school or if the 5 schools that have gym also have an art class. Therefore this statement is false.

In option III: Math is an academic class that all schools in Dawn County offer.
The table shows that the % of schools offering Math is 100% therefore this statement is true.

QUESTION 3 : Statistical Information Tables:

New York City Earnings by Educational Attainment:

Name	Average	Male	Female
Overall	$41,098	$44,181	$37,589
Less Than High School	$20,388	$22,979	$16,556
High School Grad	$28,781	$32,238	$23,771
Some College	$36,454	$41,069	$32,482
Bachelors Degree	$58,076	$63,564	$52,838
Graduate Degree	$75,688	$88,199	$68,414

Question 1: What is the average difference between male and female yearly earnings in New York City?

Answer: The average earnings of male is: $48,705.

The average earnings of female is: $38,608.

The average difference between male and female yearly earnings in New York City is: $48,705 - $38,608 = $10,097

Question 2: What is the average percentage increase in salary a New York City resident can expect after completing a graduate degree?

ANSWER: The average percentage increase in male earnings after attaining graduate degree is: 100* (88199-63564)/63564 = 38.75%.

The average percentage increase in female earnings after attaining graduate degree is: 100*(68414-52838)/52838= 29.47%.

The average percentage increase in salary a New York City resident can expect after completing a graduate degree is (38.75+29.47)/2 = 34.11%.

SCIENTIFIC REASONING QUESTIONS

1. **You run an experiment to test which brand of food your dog prefers. You offer her three different brands of food at each meal, presenting them all at the same time (so that she does not just prefer the one that comes first!). Three weeks of data collection indicate that she ate Brand C more often than Brand A or Brand B. What can you conclude from these results?**

- ○ Brand C is the healthiest food
- ○ Brand C is the cheapest food
- ◉ Brand B and Brand A taste bad
- ○ Your dog preferred Brand C but you do not know why
- ○ Brand B was her second favorite food

2. Which of the following is true about conclusions drawn from experimental data?

- ○ Everyone will agree on the same conclusions
- ○ Conclusions are always factual
- ○ The process is only reserved for when scientists disagree
- ◉ Conclusions are based on your interpretation of the data

3. Why do scientists have differing opinions about what the same set of data means?

- ○ They have personal beliefs that differ
- ◉ They simply interpret the data differently
- ○ All are correct
- ○ They are biased by their education
- ○ They are influenced by their employer or funding source

4. A scientist is running a test of her hypothesis. Which step of the scientific method is she executing?

- ◉ Experiment
- ○ Observation
- ○ Conclusion
- ○ Analysis

5. Which of these is a process that requires scientists to critique each other's work and decide whether it meets the standards of the scientific community?

- ○ Experiment
- ◉ Peer review
- ○ Question
- ○ Conclusion

MULTISOURCE REASONING QUESTIONS

Article 1 News article in an environmental publication.
July 19 – If current trends continue, fossil fuels will be exhausted by 2052. Industry and transportation and the inability of governments to put stricter emissions regulations in place means that there will be a greater demand for alternative energy sources. Additionally, recent concerns about the high-cost of implementing new systems such as public transportation in industrialized areas has led many voters to actually strike down propositions to subsidize alternative fuel research.

Article 2 Interview with a well-known scientist.
August 3 – Dr. Lisa Goodman, one of the team of architects behind several new battery-operated commercial vehicles, has criticized the government's unwillingness to aggressively lobby voters to pass measures to reduce fossil fuel usage. She suggests that without a significant reduction in per-person fossil fuel consumption, the rate of global warming could soon increase threefold. "I know that voters continue to reject costly measures to reduce widespread fossil fuel consumption such as large-scale public transportation projects, and that

politicians are naturally going to avoid stumping for unpopular policies. However, if something isn't done soon, by 2055, a barrel of gasoline may become a luxury that only the rich can afford."

Article 3 Article from a weekly news magazine.

August 29 – The price of crude oil has jumped by 500% over the last decade as a decrease in supply has met with an increased demand. This demand has encouraged many new oil wells to launch in the Gulf of Mexico, and some American environmental groups have expressed concern that certain oil companies are not following the safest procedures, emphasizing that the companies are more concerned with the speed of extraction than the well-being of the ecosystem. Some scientists in the Gulf have called for an increase in safety regulations for oil companies drilling off the coast, but the companies warn that this may dramatically increase the cost of crude oil, at a time when many Americans are already struggling to o pay the increased price.

Consider each of the following statements.

Does the information in the three articles support the inference as stated?

Question 1 Politicians usually do not agree with one another on issues of global warming and fossil fuel consumption.

A Yes

B No

Question 2 An increase in worldwide demand for crude oil has made the oil companies' safety standards fall.

A Yes

B No

Question 3 Dr. Goodman would likely support a public referendum on whether to require the oil companies to have better safety and ecological regulations.

A Yes

B No

Question 4 The actions of the oil companies have led some voters to reject measures they consider costly.

A Yes

B No

ANSWERS:

1) No, since it is no where mentioned that there is a conflict among the politicians regarding Global warming and fossil fuel consumption.

2) No, since in the table 3, it is given that the worldwide demand is increasing and few companies are not following proper safety measures, but there is no direct relationship given which can prove the above point.

3) No, since Dr Goodman is focusses on per person fossil fuel usage and it's reduction and not on any referendum for oil companies.

4) No, since there is no direct relationship given in the tables for the two points mentioned in the question

ANALYTICAL REASONING QUESTIONS

Q1: Find the number of triangles in the given figure.
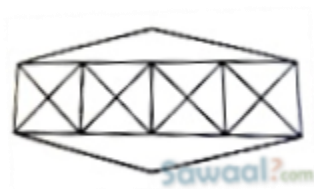

☑ A) 28   ☐ B) 32

☐ C) 36   ☐ D) 40

Q2: Count the number of triangles and squares in the given figure.

☐ A) 36 triangles, 7 Squares   ☐ B) 38 triangles, 9 Squares

☑ C) 40 triangles, 7 Squares   ☐ D) 42 triangles, 9 Squares

Q3: If white is called black, black is called red, red is called yellow, yellow is called green, green is called blue, blue is called violet and violet is called orange, what would be the colour of human blood?

☐ A) green   ☐ B) black

☐ C) red   ☑ D) yellow

Q4: What will come in the place of question mark (?) in the below series?

$\Omega \le ®$	$® \Omega \ge$	$\Omega < ®$	?

A	B	C	D
$\Omega ® >$	$® > \Omega$	$® \Omega >$	$® < \Omega$

A) A	B) C
B) D	D) B