

Assignment

Ques 1

To describe the various restaurants in the city, we let p denote the statement, "The food is good", q denote the statement, "The service is good", and r denote the statement, "The rating is three-star". Write down the following statements in symbolic form:

- a) Either the food is good or the service is good, or both.

$$p \vee q$$

- b) Either the food is good or the service is good but not both.

$$p \wedge \bar{q} \vee \bar{p} \wedge q$$

- c) The food is good while the service is poor.

$$p \wedge \sim q$$

- d) It is not the case that both the food is good and the rating is three-star.

$$\sim(p \wedge r) \text{ or } \sim p \vee \sim r$$

- e) If both the food and services are good, then the rating will be three-star.

$$(p \wedge q) \rightarrow r$$

- f) It is not the case that a three-star rating always means good food and good service.

$$\sim(r \rightarrow (p \wedge q))$$

Ques 2 Let p denote the statement, "The material is interesting" and q denote the statement "The exercises are challenging" and r denote the statement, "The course is enjoyable". Write the following statements in symbolic form:

a) The material is interesting and the exercises are challenging.

$$p \wedge q$$

b) The material is uninteresting, the exercises are not challenging, and the course is not enjoyable.

$$\sim p \wedge \sim q \wedge \sim r$$

c) If the material is not interesting and the exercises are not challenging, then the course is not enjoyable.

$$\sim p \wedge \sim q \rightarrow \sim r$$

d) The material is interesting means the exercises are challenging and conversely.

$$p \equiv q$$

e) Either the material is interesting or the exercises are not challenging but not both.

$$p \vee \sim q, p \wedge \sim(\sim q) \vee \sim p \wedge \sim q$$

$$p \wedge q \vee \sim(p \vee q)$$

Ques 3 Write the following statements in symbolic form:

- a) The sun is bright ~~but~~ and the humidity is not high

Let p be the proposition "The sun is bright"
and q be the proposition "The humidity is high"
 $\therefore p \wedge \sim q$

- b) If I finish my homework before dinner and it does not rain, then I will go the ball game.

Let p be the proposition "I finish my homework before dinner" and q be the proposition "It rains" and r be the proposition "I will go to the ball game".
 $\therefore (p \wedge \sim q) \rightarrow r$

- c) If you do not see me tomorrow, it means I have go to Chicago.

Let p be the proposition "You see me tomorrow" and q be the proposition "I have go to Chicago"
 $\therefore \sim p \rightarrow q$

- d) If the utility cost goes up or the request for additional funding is denied, then a new computer will be purchased if and only if we can show that current computing facilities are indeed not adequate.

Let p be the proposition "The utility cost goes up",
 q be the proposition "The request for additional funding is denied", r be "a new computer will be purchased" and s be the proposition

"we can show that the current computing facilities are indeed adequate".
 $\therefore (p \vee q) \rightarrow (r \leftrightarrow \sim s)$

Ques 4. Let p denote the statement "The weather is nice" and q denote the statement "We have a picnic". Translate the following in English and simplify if possible:

a) $p \wedge \bar{q}$
 "The weather is nice and we do not have a picnic."

b) $p \leftrightarrow q$
 "The weather is nice if and only if we have a picnic."

c) $\bar{q} \rightarrow \bar{p}$
 "If we do not have a picnic, then the weather is not nice."

d) $(\bar{p} \vee q) (\bar{p} \wedge \bar{q})$
 "It is not the case that the weather is not nice or ~~the~~ we have a picnic or the weather is nice and we do not have a picnic."

Ques 5. a) Write a comp. st. that is true when none or one or two of the statements p, q, r are true.
 $\therefore p \wedge q \rightarrow \sim r$

p	q	r	$p \wedge q$	$\sim r$	$p \wedge q \rightarrow \sim r$
T	T	T	T	F	F
T	T	F	T	T	T
T	F	T	F	F	T
T	F	F	F	T	T
F	T	T	F	F	T
F	T	F	F	T	T
F	F	T	F	F	T
F	F	F	F	T	T