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MATH 3503: Tashfeen's Discrete Mathematics
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Homework 1

Question 1. Please read chapters 0 and 1 of Chartrand et al. and write a couple sentences about a /example/concept that you found difficult or interesting and why?

I enjoyed the section where it described how the google page rank algorithm works. I've learned about how it works before but having it described in terms of discrete mathematics connected it to interesting things ive learned already.

I struggled a little with the implication word problems. I think I understand the concept fine, but determining what part of the sentence corresponds to what was a little confusing

Question 2. Let P, Q and R be statements. Determine whether the following is true.

$$P \oplus (Q \oplus R) \equiv (P \oplus Q) \oplus R. \quad \text{Use a truth table.}$$

P	Q	R	$P \oplus (Q \oplus R)$	$(P \oplus Q) \oplus R$
F	F	T	T	T
F	T	T	F	F
F	F	F	F	F
F	T	F	T	T
T	F	T	F	F
T	T	T	T	T
T	F	F	T	T
T	T	F	F	F

Table 1. Truth table for question 2.

$P \oplus (Q \oplus R) \equiv (P \oplus Q) \oplus R$ is true

Question 3. Let P, Q and R be statements. Determine whether the following is true.

$$P \vee (Q \oplus R) \equiv (P \vee Q) \oplus (P \vee R). \quad \text{Use a truth table.}$$

P	Q	R	$P \vee (Q \oplus R)$	$(P \vee Q) \oplus (P \vee R)$
T	T	T	T	F
T	T	F	T	F
T	F	T	T	F
T	F	F	T	F
F	T	T	F	F
F	T	F	T	T
F	F	T	T	T
F	F	F	F	F

Table 2. Truth table for question 3.

$P \vee (Q \oplus R) \equiv (P \vee Q) \oplus (P \vee R)$ is not true

Question 4. For an integer n, consider the open sentences

$$P(n) : n(n+1)(2n+1)/6 \text{ is even.} \quad Q(n) : (n+1)^2(n+2)^2/4 \text{ is even.}$$

Determine whether the biconditionals $P(1) \iff Q(1)$ and $P(2) \iff Q(2)$ are true or false.

$P(1) = 1$ is even $=$ false

$Q(1) = 9$ is even $=$ false

$P(1) \iff Q(1) = true$

$P(2) = 5$ is even $=$ false

$Q(2) = 36$ is even $=$ true

$P(2) \iff Q(2) = false$

Question 5. For statements P and Q, determine whether the compound statement

$$(P \wedge (\sim Q)) \Rightarrow (P \vee Q)$$

is a tautology, a contradiction or neither.

P	Q	$(P \wedge (\sim Q))$	$(P \vee Q)$	$(P \wedge (\sim Q)) \Rightarrow (P \vee Q)$
T	T	F	T	T
F	F	F	F	T
T	F	T	T	T
F	T	F	T	T

Table 3. Truth table for question 5.

$(P \wedge (\sim Q)) \Rightarrow (P \vee Q)$ is a tautology

Question 6. Each of the following statements is an implication $P \Rightarrow Q$. For each statement, indicate what P and Q are.

(a) I'm going to my class reunion only if I lose weight.
(b) To win a free $20 gift certificate, I must spend $100 at the store.
(c) To win the game, it is necessary that we score a touchdown.
(d) It is necessary to do research to be promoted to professor.
(e) I'll get an A on this exam if I'm lucky.
(f) All I need is a B on the final exam to get an A in the course.

- a.

P = Going to class reunion

Q = If i lose weight

- b.

P = Won certificate

Q = Spend 100 dollars

- c.

P = Won the game

Q = Scored touchdown

- d.

P = Promoted to professor

Q = Did research

- e.

P = Got A

Q = Is lucky

- f.

P = Got a B on the exam

Q = Got an A in the course