

Task 1

Q(2)

- a) not a proposition
- b) not a proposition
- c) This is a proposition that is false
- d) not a proposition
- e) This is a proposition that is false.
- f) not a proposition

Q(4)

- a) Jennifer and Teja are not friends
- b) There are not 13 items in a baker's dozen.
- c) Abby sent fewer than 101 text messages yesterday.
- d) 121 is not a perfect square.

Q(25)

- a) You buy an ice cream cone if and only if it is hot outside.
- b) You win the contest if and only if you hold the only winning ticket.
- c) You get promoted if and only if you have connections.
- d) Your mind will decay if and only if you watch television.
- e) The train runs late if and only if it is a day I take the train.

Q(26)

- a) You will get an A in this course if and only if you learn how to solve discrete mathematics problems.
- b) You will be informed if and only if you read the newspaper every day.
- c) It rains if and only if it is a weekend day.
- d) You can see the wizard if and only if he is not in

Q(27)

a) the converse is "I will ski tomorrow only if it snows today." the contrapositive "If I don't ski tomorrow, then it will not have snowed today." The inverse is "If it does not snow today, then I will not ski tomorrow."

b) The converse is "If I come to class, then there will be a quiz." The contrapositive is "If I don't come to class, then there won't be a quiz." The inverse is "If there is not going to be a quiz, then I don't come to class."

c) The converse is "A positive integer is a prime if it has no divisors other than 1 and itself." The contrapositive is "If a positive integer has a divisor other than 1 and itself, then it is not prime The inverse is "If a positive integer is not prime, then it has a divisor other than 1 and itself."

Q(28)

a) Converse: If I stay home, then it will snow tonight. Contrapositive: If I do not stay at home, then it will not snow tonight. Inverse: If it does not snow tonight, then I will not stay home.

b) Converse: Whenever I go to the beach, it is a sunny summer day. Contrapositive: Whenever I do not go to the beach, it is not a sunny summer day. Inverse: Whenever it is not a sunny day, I do not go to the beach.

c) Converse: If I sleep until noon, then I stayed up late. Contrapositive: If I do not sleep until noon, then I did not stay up late. Inverse: If I don't stay up late, then I don't sleep until noon.

Q(31)

a) $P \quad \neg P \quad P \wedge \neg P$

T F F

F T F

b) $P \quad \neg P \quad P \vee \neg P$

T F T

F T T

c) $p \quad q \quad \neg q \quad p \vee \neg q \quad (p \vee \neg q) \rightarrow q$

T F T T T

T T T T F

F F T F T

F T T T F

Q(45)

For "Fred is not happy," the truth value is $1 - 0.8 = 0.2$.

For "John is not happy," the truth value is $1 - 0.4 = 0.6$.

Q(46)

The truth value of "Fred and John are happy" is $\min(0.8, 0.4) = 0.4$.

The truth value of "Neither Fred nor John is happy" is $\min(0.2, 0.6) = 0.2$.