DISCRETE MATHEMATICS - 411 – ASSIGNMENT NO.1

2. Which of these are propositions? What are the truth values of those that are propositions?
a) Do not pass go.
b) What time is it?
c) There are no black flies in Maine.

6. Suppose that Smartphone A has 256MBRAMand 32GB ROM, and the resolution of its camera is 8 MP; Smartphone B has 288 MB RAM and 64 GB ROM, and the resolution of its camera is 4 MP; and Smartphone C has 128 MB RAM and 32 GB ROM, and the resolution of its camera is 5 MP. Determine the truth value of each of these propositions.
a) Smartphone B has the most RAM of these three smartphones.
b) Smartphone C has more ROM or a higher resolution camera than Smartphone B.
c) Smartphone B has more RAM, more ROM, and a higher resolution camera than Smartphone A.
d) If Smartphone B has more RAM and more ROM than Smartphone C, then it also has a higher resolution camera A.

8. Let p and q be the propositions

p : I bought a lottery ticket this week.

q : I won the million dollar jackpot.

Express each of these propositions as an English sentence.

f) $\neg p \rightarrow \neg q$

g) $\neg p \wedge \neg q$

h) $\neg p \vee (p \wedge q)$

12. Let p, q, and r be the propositions

p :You have the flu.

q :You miss the final examination.

r :You pass the course.

Express each of these propositions as an English sentence.

c) $q \rightarrow \neg r$

e) $(p \rightarrow \neg r) \vee (q \rightarrow \neg r)$

f) $(p \wedge q) \vee (\neg q \wedge r)$

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15. Let p, q, and r be the propositions

p : Grizzly bears have been seen in the area.

q : Hiking is safe on the trail.

r : Berries are ripe along the trail.

Write these propositions using p, q, and r and logical connectives (including negations).

a) Berries are ripe along the trail, but grizzly bears have not been seen in the area.

b) Grizzly bears have not been seen in the area and hiking on the trail is safe, but berries are ripe along the trail.

c) If berries are ripe along the trail, hiking is safe if and only if grizzly bears have not been seen in the area.

d) It is not safe to hike on the trail, but grizzly bears have not been seen in the area and the berries along the trail are ripe.

e) For hiking on the trail to be safe, it is necessary but not sufficient that berries not be ripe along the trail and for grizzly bears not to have been seen in the area.

f) Hiking is not safe on the trail whenever grizzly bears have been seen in the area and berries are ripe along the trail.

20. For each of these sentences, determine whether an inclusive or, or an exclusive or, is intended. Explain your answer.

a) Experience with C++ or Java is required.

b) Lunch includes soup or salad.

c) To enter the country you need a passport or a voter registration card.

d) Publish or perish.

31. Construct a truth table for each of these compound propositions.

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

d) $(p \vee q) \rightarrow (p \wedge q)$

f) $(p \rightarrow q) \rightarrow (q \rightarrow p)$

34. Construct a truth table for each of these compound propositions.

d) $\neg p \oplus \neg q$

e) $(p \oplus q) \vee (p \oplus \neg q)$

f) $(p \oplus q) \wedge (p \oplus \neg q)$

37. Construct a truth table for each of these compound propositions.

b) $\neg p \rightarrow (q \rightarrow r)$

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

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