

HOMEWORK 1.1 (2, 14, 24, 32, 36)

2. WHICH OF THESE ARE PROPOSITIONS? WHAT ARE THE TRUTH VALUES OF THOSE THAT ARE PROPOSITIONS?

A) DO NOT PASS GO
- NOT A PROPOSITION

B) WHAT TIME IS IT?
- NOT A PROPOSITION

C) THERE ARE NO BLACK FLIES IN MAINE.
- PROPOSITION, TRUTH VALUE: FALSE

D) $4 + x = 5$
- NOT A PROPOSITION

E) THE MOON IS MADE OF GREEN CHEESE.
- PROPOSITION, TRUTH VALUE: FALSE

F) $2^n \geq 100$
- NOT A PROPOSITION

24)

A) IF I REMEMBER TO SEND YOU THE ADDRESS, THEN YOU HAVE SENT ME AN EMAIL.

B) IF YOU WERE BORN IN THE US, THEN YOU ARE A CITIZEN.

C) IF YOU KEEP YOUR TEXTBOOK, THEN IT WILL BE USEFUL IN THE FUTURE.

D) IF THE GOALIE PLAYS WELL, THEN THE RED WINGS WILL WIN THE STANLEY CUP.

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14. LET p , q , AND r BE:

p : YOU GET AN A ON THE FINAL

q : YOU DO EVERY EXERCISE IN THIS BOOK

r : YOU GET AN A IN THE CLASS

A) YOU GET AN A IN THIS CLASS, BUT YOU DID NOT DO EVERY EXERCISE IN THE BOOK

$$r \wedge \neg q$$

B) YOU GOT AN A ON THE FINAL, YOU DO EVERY EXERCISE IN THIS BOOK, AND YOU GET AN A IN THE CLASS.

$$p \wedge q \wedge r$$

C) $r \rightarrow p$

D) $(p \wedge \neg q) \wedge r$

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

F) $r \leftrightarrow (p \vee q)$

E) IF YOU GET THE JOB, THEN YOU HAVE THE BEST CREDENTIALS

F) IF THERE IS A STORM, THEN THE BEACH ERRODS.

G) IF YOU LOG INTO THE SERVER, THEN YOU HAVE A VALID PASSWORD.

H) IF YOU DON'T START THE CLIMB TO LATE, THEN YOU WILL REACH THE SUMMIT.

a) $p \rightarrow \neg p$

p	$\neg p$	$p \rightarrow \neg p$
T	F	F
F	T	T

b) $p \leftrightarrow \neg p$

p	$\neg p$	$p \leftrightarrow \neg p$
T	F	F
F	T	F

c) $p \oplus (p \vee q)$

p	q	$p \vee q$	$p \oplus (p \vee q)$
T	T	T	F
T	F	T	F
F	T	T	T
F	F	F	F

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

p	q	$p \wedge q$	$p \vee q$	$(p \wedge q) \rightarrow (p \vee q)$
T	T	T	T	T
T	F	F	T	T
F	T	F	T	T
F	F	F	F	T

e) $(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow \neg q)$

p	q	$\neg p$	$q \rightarrow \neg p$	$p \leftrightarrow \neg q$	$(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow \neg q)$
T	T	F	F	T	F
T	F	F	T	F	F
F	T	T	T	F	F
F	F	T	T	T	T

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

p	q	$\neg q$	$p \leftrightarrow q$	$p \leftrightarrow \neg q$	$(p \leftrightarrow q) \oplus (p \leftrightarrow \neg q)$
T	T	F	T	F	T
T	F	T	F	T	T
F	T	F	F	T	T
F	F	T	T	F	T

36.

a) $(p \vee q) \vee r$

p	q	r	$p \vee q$	$(p \vee q) \vee r$
T	T	T	T	T
F	T	T	T	T
T	F	T	T	T
T	T	F	T	T
F	F	T	F	T
F	T	F	T	T
T	F	F	T	T
F	F	F	F	F

c) $(p \wedge q) \vee r$

p	q	r	$p \wedge q$	$(p \wedge q) \vee r$
T	T	T	T	T
F	T	T	F	T
T	F	T	F	T
T	T	F	T	T
F	F	T	F	T
F	T	T	F	F
T	F	F	F	F
F	F	F	F	F

b) $(p \vee q) \wedge r$

p	q	r	$p \vee q$	$(p \vee q) \wedge r$
T	T	T	T	T
F	T	T	T	T
T	F	T	T	T
T	T	F	T	F
F	F	T	F	F
F	T	F	T	F
T	F	F	T	F
F	F	F	F	F

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

p	q	r	$p \wedge q$	$(p \wedge q) \wedge r$
T	T	T	T	T
F	T	T	F	F
T	F	T	F	F
T	T	F	T	F
F	F	T	F	F
F	T	F	F	F
T	F	F	F	F
F	F	F	F	F

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

p	q	r	$\neg r$	$(p \vee q)$	$(p \vee q) \wedge \neg r$
T	T	T	F	T	F
F	T	T	F	T	F
T	F	T	F	T	F
T	T	F	T	T	T
F	F	T	F	F	F
F	T	F	T	T	T
T	F	F	T	T	T
F	F	F	T	F	F

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

p	q	r	$\neg r$	$p \wedge q$	$(p \wedge q) \vee \neg r$
T	T	T	F	T	T
F	T	T	F	F	F
T	F	T	F	F	F
T	T	F	T	T	T
F	F	T	F	F	F
F	T	F	T	F	T
T	F	F	T	F	T
F	F	F	T	F	T