

MATH 363 Discrete Mathematics

Assignment 1

Due by January 21st

1. (**1pt each**) Which of these are propositions? What are the truth values of those that are propositions?

- i*) What time is it?
- ii*) The moon is made of green cheese.
- iii*) $2^n \geq 100$.

Consider the following propositions

- p : I bought a lottery ticket this week.
- q : I won the million dollar jackpot on Friday.
- r : You get an A on the final exam.
- s : You do every exercise in the textbook.
- t : You get an A in this class.

2. (**2pt each**) Express each of these propositions as an English sentence.

- i*) $\neg p \wedge \neg q$
- ii*) $\neg p \vee (p \wedge q)$
- iii*) $\neg(p \vee q)$

3. (**2pt each**) Write these propositions using r, s, t and logical connectives.

- i*) You get an A on the final, you do every exercise in the textbook but you don't get an A in this class.
- ii*) Getting an A on the final and doing every exercise in the textbook is sufficient for getting an A in this class.
- iii*) You will get an A in this class if and only if you either do every exercise in the textbook or you get an A on the final.

4. (**3pt each**) Determine whether these biconditionals are true or false.

- i*) $2 + 2 = 4$ if and only if $1 + 1 = 2$
- ii*) $0 > 1$ if and only if $2 > 3$
- iii*) $2 = 5$ if and only if $8 - 3 = 4$

5. (**4pt each**) Determine whether the following compound propositions are logically equivalent.

- i*) $p \rightarrow \neg p$ and $(p \vee q) \rightarrow (p \wedge q)$
- ii*) $p \leftrightarrow q$ and $(p \rightarrow q) \wedge (q \rightarrow p)$

6. (**4pt each**) Determine whether the following compound propositions are tautologies.
(+**4pt** if you use logical equivalences instead of truth tables)

- i*) $(\neg p \wedge (p \rightarrow q)) \rightarrow \neg q$
- ii*) $[p \wedge (p \rightarrow q)] \rightarrow q$