

# MATH 55 - WORKSHEET 1 (WEDNESDAY)

1 What are the truth values of these statements?

a  $\exists!xP(x) \rightarrow \exists xP(x)$

b  $\forall xP(x) \rightarrow \exists!xP(x)$

c  $\exists!x\neg P(x) \rightarrow \forall xP(x)$

2 Read Example 12 in 1.5. Then express the following statements as a logical expression involving predicates, quantifiers with a domain consisting of all people, and logical connectives

a "Everyone has at least one best friend"

b "Everyone has at most 2 best friends"

3 Read Example 12 and Example 13 in 1.6. Then, for each of these sets of premises, what relevant conclusion or conclusions can be drawn? Explain the rules of inference used to obtain each conclusion from the premises (Table 1,2 in 1.6).

a "If I play hockey, then I am sore the next day." "I use the whirlpool if I am sore." "I did not use the whirlpool."

b "All insects have six legs." "Dragonflies are insects." "Spiders do not have six legs." "Spiders eat dragon- flies."

4 Express the quantification  $\exists!P(x)$ , using universal quantifications, existential quantifications, and logical operators.