

1A LOGIC WORKSHEET 9

NAME:

CLASS:

TUTOR:

- 5 Excellent
- 4 Good
- 3 Satisfactory
- 2 Weak
- 1 Very poor

Reading

Steinhart, *More Precisely* Ch. 2.

Kyburg, *Probability and Inductive Logic*, Ch. 2

SECTION A

Use the language of FOL with identity, define: reflexive, symmetric, transitive, function. Then give examples (if any exist) of relations on a specified domain that are:

- (a) Symmetric and transitive but not reflexive
- (b) Reflexive and transitive but not symmetric
- (c) Reflexive and symmetric but not transitive
- (d) Symmetric, transitive *and* a function

SECTION B

1. Two cards are drawn at random and without replacement from a standard pack of 52 cards. What is the probability that:
 - (a) The first is a king or an ace
 - (b) They are both hearts given that one is a heart
 - (c) They are both hearts given that one is the queen of hearts. If (b) and (c) have different answers then explain briefly why.
2. You stop two random parents on the street.
 - (a) Jane has two children. You ask her: 'Is at least one of them a girl?'—Yes. What is the probability that she has two girls?
 - (b) Jill has two children. 'Is at least one of them a girl born on a Monday?'—Yes. What is the probability that she has two girls? If (a) and (b) have different answers then explain briefly why.
3. Billy is on trial for murder. CSI shows that somebody with Billy's DNA was at the scene. 0.01% of the UK population shares Billy's DNA. So, the prosecution argues, there is a 99.99% probability that Billy was at the scene. Not so, says the defence: the UK population is 60 million, so there are 6000 people with Billy's DNA, so the probability that Billy was at the scene is $1 / 6000$. Who is right?

1A LOGIC WORKSHEET 9