1. The Problem of Proof

Technical terminology

Epistemology

Epistemology is the philosophical word for the study of the nature of beliefs and the evidence for them. It deals with two key questions:
1. How can we know anything?
2. How can we be certain that what we know is correct?

2. Introductory problems

Consider the following statements:
   a. 2+2 = 4
   b. Handel was a great musician
   c. I watched the weather this morning; it’s going to rain today
   d. I know Osama Bin Laden is a terrorist
   e. I know that daffodils are yellow
   f. I know that water boils at 100°C at standard pressure
   g. I know that Natasha and Kenneth love each other

1. Are any of the statements unprovable?
2. What evidence, if any, can be provided that suggests these statements are true, even if the evidence is not a concrete 100% proof?
3. Can any of these statements be proved for certain, beyond any doubt?
4. Can any of these statements be proved beyond reasonable doubt?

3. Inductive arguments

   1. An argument that interprets various pieces of evidence to reach a conclusion.
   2. Inductive arguments are said to be a posteriori meaning that they are based on evidence from which a conclusion is reached.

   N.B. Inductive arguments reach conclusions on the basis of probability. The conclusion is what is most probable. How could the use of probability be a weakness with inductive arguments?

   An example of deductive thinking

   The police investigating a murder search for evidence such as:
   - weapons, witnesses, forensic evidence, motive behind the crime

   A judge hearing a court case reaches a conclusion beyond reasonable doubt.
   i.e. the evidence is interpreted and the conclusion is reached on the basis of what seem probable.

   N.B.

   Even if the evidence is very convincing there is always a slight chance that a conclusion reached by inductive argument may be wrong, as there is always an element of doubt, however small the doubt is.

4. Are inductive arguments very helpful?

Bertrand Russell and the Scandal of philosophy

Every day we predict what will happen in the future based upon what has happened in the past, but our conclusion about what will happen in the future goes beyond the evidence. This is the ‘scandal’. Bertrand Russell stated that we should be cautious about placing too much confidence in our predictions. i.e. basing arguments on probability leads to what is known as the problem of certainty.
Some examples of the problem of certainty:

A. The Guildford Four were responsible for the Birmingham pub bombing

B. The sun will rise tomorrow morning

C. Martha: ‘On all birthdays up to now I’ve been less than twenty-five years old. So by induction, on all my birthdays I’ll be less than 25 years old’.

I think therefore I laugh: The flipside of Philosophy, p. 67, J A Paulos

5. Deductive argument

1. A deductive argument is an argument that starts from certain principles or assumptions on which a conclusion is based.

2. These starting principles or assumptions are called ‘premises’ in Philosophy

3. Arguments that are deductive are often termed *a priori* which means that the arguments are based on first principles from which a conclusion is reached. Deductive arguments are not about interpreting various pieces of evidence using probability.

4. If the premises of a deductive argument are true and the argument is logical, the conclusion is true or certain.

5. There is no element of doubt regarding the conclusions of a validly constructed deductive argument, because deductive arguments do not use probability.

An example of a deductive argument:

**Premise 1:** Socrates is a human being  
**Premise 2:** Human beings are mortal  
**Conclusion:** Socrates is mortal

N.B. In a deductive argument:

1. If the premises lead logically to a conclusion, the argument is said to be valid.
2. However, an argument is only true if the premises are true and the steps of the argument are valid.
3. An argument may be valid even if the premises are not true.

6. On what grounds can a deductive argument's validity be challenged?

1. If the premises are false or unprovable by evidence

2. If the argument is not logical

3. If the premises of the argument may lead to more than one conclusion (i.e. they can be interpreted in more than one way)

7. How can the validity of a deductive argument be tested?

1. A classical test of deductive logic is to reverse one of the premises i.e. make the premise negative. If this makes the argument as a whole false, then the original argument was valid.

2. If making a premise negative does not make the argument false then the deductive argument was not valid in the first place.

8. Some examples of deductive arguments

Test the validity of the following two arguments and identify the grounds on which their validity can be disputed

**Example 1:**

1. Cats are mammals  
2. Mammals are mortal  
3. Cats are mortal

**Example 2:**

1. All mammals have at least 2 legs  
2. My uncle is a mammal  
3. My uncle has at least two legs

9. Are deductive arguments very useful?

Yes and No!

1. Deductive arguments are useful in the worlds of logic and mathematics in which answers are a matter of certainty not probability.

2. However, in many cases the premises of an argument are disputable and a matter of interpretation, so the deductive argument’s truth is a matter of debate, not certainty.