IAL P4

Issues from P4

Which sections of the specification do students need to know to do the question?
Is the question suitable (with rigorous wording etc) for a written examination.
Is the question better suited to classroom use?
Avoid this question!

1. Prove by contradiction that $\sqrt{3}$ is irrational.

2 If I use the same sort of process to 'prove' $\sqrt{4}$ is irrational where does the process go wrong?

3 Prove that $\sqrt[3]{3}$ is irrational.

4. Suppose *k* is a rational number and *n* is an irrational number.

(a) Prove by contradiction that $k + n$ and kn are irrational.

Suppose both *k* and *n* are irrational.

(b) What can be concluded then?

5 Prove, by contradiction, that no power of 2 can be written as the sum of consecutive numbers.

6 Use a similar approach to that of finding $\int e^{2x}\cos x\,dx$ to find $\int \sec^4 x\,dx$

7 Make a critique of this proof of the irrationality of $\sqrt{2}$

Start with $(\sqrt{2}-1)(\sqrt{2}+1)=1 \Rightarrow \sqrt{2}=\dfrac{1}{\sqrt{2}-1}-1$

Now let $\sqrt{2}=\dfrac{a}{b}$ where *a, b* are whole numbers in their lowest terms and $2b > a > b > 1$

So $\sqrt{2}=\dfrac{1}{\sqrt{2}-1}-1 \Rightarrow \sqrt{2}=\dfrac{1}{\frac{a}{b}-1}-1=\dfrac{2b-a}{a-b}$

Now $2b-a$ and $a-b$ are positive whole numbers but $a-b<b$ and $2b-a<a$ so we have a new denominator and numerator ……