STEP 2005, Paper 1 – Notes (2 pages; 10/5/18)

See separate documents for Sol'ns.

(N): brief comment only

1	2	3	4	5	6	7	8
Sol'n	(N)	Sol'n	Sol'n	Sol'n	N	N	N

9	10	11		12	13	14
(N)	(N)	Sol'n		Sol'n	Sol'n	Sol'n

Q2 Straightforward application of straight line equations.

Q6 For (ii), we have to eliminate one variable (k^2) from two equations involving three variables. In order to minimise the risk of errors (and of possibly going round in circles), a standard 'sledgehammer' approach is simply to make k^2 the subject of each equation, and equate the two expressions for k^2. In fact, this gives the required result straightaway, but the method could have been applied even had this not been the case.

For the last part, the fact that $a \neq b$ virtually tells us to divide by $a - b$ at some point.

Note that each part is a 'show that' question.

Q7 Parts (i) & (ii) are straightforward. Once numbers are plugged in (ie $r = 1,2, \dots$), part (iii) is no harder (and doesn't use parts (i) & (ii)). Of course it looks horrible, but it shows the value of starting to write things out.

(Instead of rearranging the rth term - as done in the official sol'ns - it is possible to first simplify the term for r=1, then r=2, and observe the pattern.)

Q8 Straightforward and short. Because the only method of solving differential equations in the C1-C4 syllabus is Separation of Variables, there is really no theory to know for these questions.

The Hints & Answers states that the solution in (i) is the pair of straight lines $y = \pm(x + 1)$, but this seems to overlook the fact that $y = 2$ when $x = 1$. So presumably it should just be the straight line $y = x + 1$.

Also, for (ii), $y = 1$ when $x = 1$, so presumably the solution of $y^2 = \frac{(lnx)^2+1}{x}$ stated in the Hints & Answers should be modified to $y = \sqrt{\frac{(lnx)^2+1}{x}}$ (ie excluding the negative root).

Q9 Also straightforward and short.

Q10 Unusually, there are (apparently) no complications in this question.