

STEP II, 2005, Q6 EC

Q6 This too was an unpopular question and very few responses were complete and correct. It appeared that some candidates were unfamiliar with the concept of a general term and yet others did not work easily with the summation operator Σ .

(i) Those who were familiar with the basic terminology appertaining to infinite series got through the first sentence of the question though, in some cases, with a lot of unnecessary labour.

Most responses showed an attempt to uses some, or all, of $S_j = (1 - x)^{-j}$, $j = 1, 2, 3$ in order to evaluate $\sum_{n=1}^{\infty} n2^{-n}$ and $\sum_{n=1}^{\infty} n^22^{-n}$.

(ii) Almost all candidates who got this far produced sufficient working to show that the general term of $(1 - x)^{-1/2}$ can be put into the form displayed in the question.

They usually went on to put $x = 1/3$ in order to evaluate the first of the 2 series in the final part of the question and generally worked accurately. However, the evaluation of the second series proved to be much more difficult. The majority of responses at least hinted at a correct overall strategy, namely differentiation followed by setting $x = 1/3$, but lack of technical expertise undermined much of the working. Nevertheless, it must be said, this evident lack of mathematical competence was not a feature of the responses to *Q6* alone.

(i) x^n , $(n + 1)x^n$, $(1/2)(n + 1)(n + 2)x^n$: 2, 6.

(ii) $\sqrt{3/2}$, $(1/4)\sqrt{3/2}$.



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