Advanced Higher Maths
SQA 2016 Specimen
Question 16

Let $S_n = \sum_{r=1}^{n} \frac{1}{r(r+1)}$ where n is a positive integer.

(a) Prove that, for all positive integers n, $S_n = \frac{n}{n+1}$. **5**

(b) Find

(i) the least value of n such that $S_{n+1} - S_n < \frac{1}{1000}$

(ii) the value of n for which $S_n \times S_{n-1} \times S_{n-2} = S_{n-8}$. **5**

Answers:

(a) Proof. See marking instructions.

(b) (i) 31

(ii) 11