

## STEP II, 2008, Q2

- 2 Let  $a_n$  be the coefficient of  $x^n$  in the series expansion, in ascending powers of  $x$ , of

$$\frac{1+x}{(1-x)^2(1+x^2)},$$

where  $|x| < 1$ . Show, using partial fractions, that either  $a_n = n + 1$  or  $a_n = n + 2$  according to the value of  $n$ .

Hence find a decimal approximation, to nine significant figures, for the fraction  $\frac{11\,000}{8181}$ .  
[You are not required to justify the accuracy of your approximation.]



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