7 A geometric progression has a 4th term of $\frac{8k^6}{27}$ and a 6th term of $\frac{32k^{10}}{243}$, where k is a constant.

The common ratio of this geometric progression is positive.

(a) Find the common ratio in terms of k and the value of the first term of this geometric progression. [4]

(b) Given that this geometric progression has a sum to infinity of 3, find the possible values of k. [3]

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8 It is given that $y = \dfrac{\ln(3x^2 + 16)}{x + 2}$.

(a) Find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ when $x = 0$.

Give your answer in the form $\ln p$, where p is a constant. [5]

(b) Given that x increases from 0 to h, where h is small, write down the approximate change in y. [1]

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