6 **(a)** A geometric progression has first term 64 and common ratio 0.5.

(i) Find the 10th term. [2]

(ii) Find the sum of the first 10 terms. [2]

(iii) Find the sum to infinity. [1]

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(b) An arithmetic progression is such that $S_{20} - 400 = 2S_{10}$ and $u_1 : u_6$ is 1 : 5.
Find the sum of the first 3 terms of this progression. [6]

7 **(a)** Variables x and y are such that $y = \dfrac{1+\cos^2 x}{\tan x}$. Use differentiation to find the approximate change in y as x increases from $\dfrac{\pi}{4}$ to $\dfrac{\pi}{4}+h$, where h is small. [5]