10 **(a)** Given that $0 \leqslant \theta < \frac{\pi}{2}$, show that $\frac{\sin\theta}{\sqrt{\text{cosec}^2\theta - 1}} + \frac{1}{\sqrt{1+\tan^2\theta}}$ can be written as $\sec\theta$. [4]

(b) Given that $\sec x = \alpha$, where $\frac{3\pi}{2} < x \leqslant 2\pi$, find $\sin x$ in terms of α. [3]

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11 An arithmetic progression has common difference d.
The 3rd term of this progression is 10.

(a) Write down expressions for the 1st term and the 2nd term of this progression.
Give your answers in terms of d only. [2]

(b) When each of the first 3 terms is squared, the sum of these squares is 140 .
There are two possible values for d.

Using your answer to part **(a)**, find the sum of the first 200 terms of the progression with the smaller value of d. [7]

Question 12 is printed on the next page.

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