4 **(a)** Show that the equation $2\cot^2 x - 9\operatorname{cosec} x - 3 = 0$ can be expressed in the form

$5\sin^2 x + 9\sin x - 2 = 0$. **[3]**

(b) (i) **In this question you must show detailed reasoning.**

Hence solve, for $0 < \theta < \pi$,

$2\cot^2 2\theta - 9\operatorname{cosec} 2\theta - 3 = 0$.

Give your answers correct to **3** decimal places. **[4]**

The small angle approximation for $\sin 2\theta$ is used to find an approximation for the smallest positive solution of the equation $2\cot^2 2\theta - 9\operatorname{cosec} 2\theta - 3 = 0$.

(ii) Show that this approximate solution is accurate to **2** decimal places. **[2]**