7.

$$z = \frac{3 + \left(k\sqrt{3}\right)\mathrm{i}}{2 + \left(\sqrt{3}\right)\mathrm{i}} \qquad k \in \mathbb{Z}$$

(a) Express z in the form $a + b\mathrm{i}$ where a and b are real functions of k.

(3)

Given that $\arg z = \frac{\pi}{6}$

(b) determine the exact value of $|z|$

(5)

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Question 7 continued

(Total for Question 7 is 8 marks)