4. [*In this question* **i** *and* **j** *are horizontal unit vectors directed due east and due north respectively.*]

A particle P moves with constant acceleration $(-\lambda\mathbf{i} + 2\lambda\mathbf{j})\,\text{m s}^{-2}$, where λ is a positive constant.

At time $t = 0$, the velocity of P is $(5\mathbf{i} - 8\mathbf{j})\,\text{m s}^{-1}$

(a) Find the velocity of P when $t = 5\,\text{s}$, giving your answer in terms of **i**, **j** and λ.

(2)

The speed of P when $t = 5\,\text{s}$ is $13\,\text{m s}^{-1}$

(b) Show that

$$25\lambda^2 - 42\lambda - 16 = 0$$

(3)

(c) Find the direction of motion of P when $t = 4\,\text{s}$, giving your answer as a bearing to the nearest degree.

(5)

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Question 4 continued

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Question 4 continued

(Total for Question 4 is 10 marks)