Question 3 (8 marks)

Figure 2 shows the quadrilateral *ABCD*, where $\overrightarrow{AB} = a$, $\overrightarrow{BC} = b$, and $\overrightarrow{CD} = c$. The points *E*, *F*, *G*, and *H* are the midpoints of the sides *AB*, *BC*, *CD*, and *DA* respectively.



Figure 2

(a) Find the following vectors in terms of a, b, and c.

(i) \overrightarrow{AD}

(1 mark)

(ii) \overrightarrow{EF}

(1 mark)

(iii) \overrightarrow{HG}

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(2 marks)

(b) (i) Explain why *EFGH* is a parallelogram.

(2 marks)

(ii) Show that the area of *EFGH* is
$$\frac{1}{4} | (a \times b) + (a \times c) + (b \times c) |$$
.



(2 marks)