## For practice and extra credit only.

1. Use vectors addition to show that
(a) In a triangle ABC vector $\overrightarrow{A B}=-\frac{1}{2} \overrightarrow{N M}$, where M and N are midpoints of sides AC and BC respectively.
(b) In a regular hexagon $\mathrm{ABCDEF}, \overrightarrow{A B}+\overrightarrow{A C}+\overrightarrow{A D}+\overrightarrow{A E}+\overrightarrow{A F}=3 \overrightarrow{A D}$
(c) In a regular $n$-gon $A_{1} \cdots A_{n}$ with center $O$ and even number of vertices the sum $\sum_{k=1}^{n} O \vec{A}_{k}=0$. Is it true if the number of vertices is odd?
2. Find the intersection point of two lines with direction vectors $(1,2)$ and $(-1,3)$ respectively if it is known that the first line goes via point $(0,0)$ and the second via point $(1,1)$.
3. Write equation of line going via points $(1,2,3)$ and $(4,5,6)$. Does point A belong to the line? If not, what is the distance from the point to the line?
a) $\mathrm{A}(-1,0,1)$
b) $\mathrm{A}(5,7,9)$
4. Find the projection of vector $\vec{v}=(2,5,7)$ onto vector $\vec{u}=(-2,1,3)$.
5. Consider parallelogram with vertices at

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(1,1,1), \quad(3,6,8), \quad(-1,2,4), \quad(1,7,11)
$$

(a) find the area of the parallelogram
(b) find equation of the plane to which the parallelogram belongs.
6. Give an example of two lines which intersect at point $(1,2,3)$ at the right angle. Justify.
7. Give an example of a plane which is orthogonal to the vector (2,3,4). Explain.

