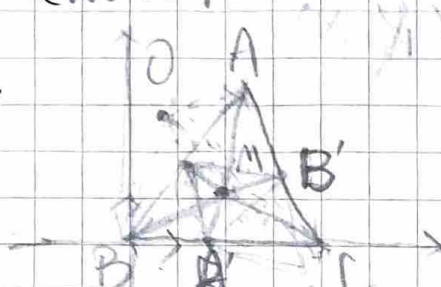


# Homework 1:

4.



$$\vec{MA} = \langle \vec{MA}, e_1 \rangle e_1 + \langle \vec{MA}, e_2 \rangle e_2$$

$$\vec{MA} + \vec{MB} + \vec{MC} = \langle \vec{MA}, e_1 \rangle e_1 + \langle \vec{MB}, e_1 \rangle e_1 + \langle \vec{MC}, e_1 \rangle e_1 + \langle \vec{MA}, e_2 \rangle e_2 + \langle \vec{MB}, e_2 \rangle e_2 + \langle \vec{MC}, e_2 \rangle e_2$$

$$2OA' = OB + OC$$

$$OM = OA + AM = OA + \frac{2}{3} A'A$$

5. When O and M overlap,

$$= \frac{3OA + 2A'A}{3}$$

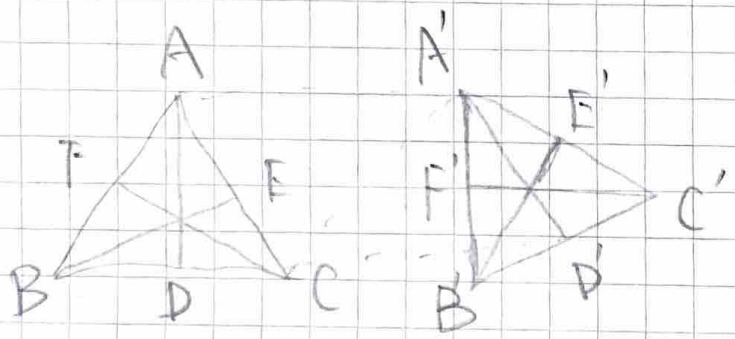
$$O = \frac{1}{3} (MA + MB + MC)$$

$$= \frac{OA + 2OA'}{3}$$

$$MA + MB + MC = 0$$

$$= \frac{1}{3} (OA + OB + OC)$$

9.



$$AC = k_1 AD'$$

$$AB = k_2 BE'$$

$$BC = k_3 CF'$$

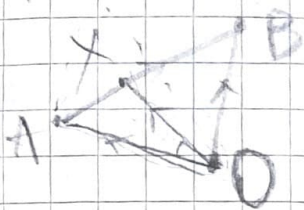
$$AC = AF + FC$$

$$BC = BF + FC$$

$$AF + FC = \frac{1}{2} k_1 (A'B' + C'A')$$

$$AF + FC = \frac{1}{2} k_1 C'A' + \frac{1}{2} k_1 A'B'$$

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$$OX = \lambda OA + (1-\lambda)OB$$

$$\lambda OA - \lambda OB = OX - OB$$

$$OX = \lambda OA + (1-\lambda)OB$$

14.  $\langle u, v \rangle^2 = \langle u, u \rangle \langle v, v \rangle \cos^2 \theta_{uv}$

$$0 \leq \cos^2 \theta_{uv} \leq 1$$

$$\langle u, v \rangle^2 \leq \langle u, u \rangle \langle v, v \rangle$$

When  $\theta_{uv} = 0$   $\langle u, v \rangle^2 = \langle u, u \rangle \langle v, v \rangle$

$$|u+v|^2 = u^2 + 2uv + v^2 = |u|^2 + 2|u||v| + |v|^2 \leq |u|^2 + 2|u||v| + |v|^2$$

$$|u+v|^2 \leq (|u|+|v|)^2 \quad |u+v| \leq |u|+|v|$$