

$$\alpha) \quad \text{i)} \quad \left(\overrightarrow{AB}, \overrightarrow{AG} \right) = 60^\circ$$

$$\text{ii)} \quad \left(\overrightarrow{AM}, \overrightarrow{BG} \right) = 90^\circ$$

$$\text{iii)} \quad \left(\overrightarrow{AM}, \overrightarrow{GA} \right) = 150^\circ$$

$$\text{iv)} \quad \left(\overrightarrow{BM}, \overrightarrow{GM} \right) = 180^\circ$$

$$\text{v)} \quad \left(\overrightarrow{GM}, \overrightarrow{GB} \right) = 0^\circ$$

$$\beta) \quad \text{i)} \quad \overrightarrow{AM} \cdot \overrightarrow{BG} = |\overrightarrow{AM}| \cdot |\overrightarrow{BG}| \cdot \cos \left(\overrightarrow{AM}, \overrightarrow{BG} \right) = 5\sqrt{3} \cdot 10 \cdot \cos 90^\circ = 50\sqrt{3} \cdot 0 = 0$$

$$\text{ii)} \quad \overrightarrow{AM} \cdot \overrightarrow{GA} = |\overrightarrow{AM}| \cdot |\overrightarrow{GA}| \cdot \cos \left(\overrightarrow{AM}, \overrightarrow{GA} \right) = 5\sqrt{5} \cdot 10 \cdot \cos (150^\circ) = 50\sqrt{3} \cdot \left(-\frac{3}{2} \right) = -75$$

$$\text{iii)} \quad \overrightarrow{GM} \cdot \overrightarrow{GB} = |\overrightarrow{GM}| \cdot |\overrightarrow{GB}| \cdot \cos \left(\overrightarrow{GM}, \overrightarrow{GB} \right) = 5 \cdot 10 \cdot \cos 0 = 5 \cdot 10 \cdot 1 = 50$$