

5.13 1)

$$\alpha) \vec{\alpha}^2 = |\vec{\alpha}|^2 = 2^2 = 4$$

$$\beta) \vec{\beta}^2 = |\vec{\beta}|^2 = 8^2 = 64$$

$$\gamma) \vec{\alpha} \cdot \vec{\beta} = |\vec{\alpha}| \cdot |\vec{\beta}| \cdot \cos(\angle \vec{\alpha}, \vec{\beta}) = 2 \cdot 8 \cdot \cos 60^\circ = 16 \cdot \frac{1}{2} = 8$$

$$\delta) (3\vec{\alpha} - \vec{\beta})(\vec{\alpha} + 2\vec{\beta}) = 3\vec{\alpha}^2 + 6\vec{\alpha}\vec{\beta} - \vec{\alpha}\vec{\beta} - 2\vec{\beta}^2 \stackrel{\text{ερώτημα α) β) γ)}}{=} 3 \cdot 4 + 6 \cdot 8 - 8 - 2 \cdot 64 = -76$$

$$\epsilon) (\vec{\alpha} + \vec{\beta})^2 = \vec{\alpha}^2 + 2\vec{\alpha} \cdot \vec{\beta} + \vec{\beta}^2 \stackrel{\text{ερώτημα α) β) γ)}}{=} 4 + 2 \cdot 8 + 64 = 84$$

5.13 2)

$$\alpha) \vec{\alpha}^2 = |\vec{\alpha}|^2 = \sqrt{3}^2 = 3$$

$$\beta) \vec{\beta}^2 = |\vec{\beta}|^2 = 2^2 = 4$$

$$\gamma) \vec{\alpha} \cdot \vec{\beta} = |\vec{\alpha}| \cdot |\vec{\beta}| \cdot \cos(\angle \vec{\alpha}, \vec{\beta}) = \sqrt{3} \cdot 2 \cdot \cos 30^\circ = \sqrt{3} \cdot 2 \cdot \frac{\sqrt{3}}{2} = 3$$

$$\delta) \vec{\alpha}(\vec{\alpha} - 2\vec{\beta}) = \vec{\alpha}^2 - 2\vec{\alpha} \cdot \vec{\beta} = 3 - 2 \cdot 3 = -3$$

$$\epsilon) (\vec{\alpha} + \vec{\beta})^2 = \vec{\alpha}^2 + 2\vec{\alpha} \cdot \vec{\beta} + \vec{\beta}^2 = 3 + 2 \cdot 3 + 4 = 13$$

5.13 3)

$$\alpha) \vec{\alpha}^2 = |\vec{\alpha}|^2 = 3^2 = 9$$

$$\beta) \vec{\beta}^2 = |\vec{\beta}|^2 = 4^2 = 16$$

$$\gamma) \vec{\alpha} \cdot \vec{\beta} = |\vec{\alpha}| \cdot |\vec{\beta}| \cdot \cos(\angle \vec{\alpha}, \vec{\beta}) = 3 \cdot 4 \cdot \cos 120^\circ = 3 \cdot 4 \cdot \left(-\frac{1}{2}\right) = -6$$

$$\delta) (\vec{\alpha} - \vec{\beta})^2 = \vec{\alpha}^2 - 2\vec{\alpha} \cdot \vec{\beta} + \vec{\beta}^2 = 9 - 2(-6) + 16 = 37$$

$$\epsilon) (3\vec{\alpha} + 2\vec{\beta})^2 = 9\vec{\alpha}^2 + 2 \cdot 6\vec{\alpha} \cdot \vec{\beta} + 4\vec{\beta}^2 = 9 \cdot 9 + 12 \cdot (-6) + 4 \cdot 16 = 73$$

5.13 4)

$$\alpha) \vec{\alpha}^2 = |\vec{\alpha}|^2 = 1^2 = 1$$

$$\beta) \vec{\beta}^2 = |\vec{\beta}|^2 = 2^2 = 4$$

$$\gamma) \vec{\alpha} \cdot \vec{\beta} = |\vec{\alpha}| \cdot |\vec{\beta}| \cdot \cos\left(\frac{2\pi}{3}\right) = 1 \cdot 2 \cdot \cos\left(-\frac{1}{2}\right) = -1$$

$$\delta) (\vec{\alpha} - 2\vec{\beta}) \cdot \vec{\beta} = \vec{\alpha} \cdot \vec{\beta} - 2\vec{\beta}^2 = -1 - 2 \cdot 4 = -9$$

$$\epsilon) (2\vec{\alpha} + 3\vec{\beta})^2 = 4\vec{\alpha}^2 + \vec{\alpha} \cdot \vec{\beta} + 9\vec{\beta}^2 = 4 \cdot 1 + 12(-1) + 9 \cdot 4 = 28$$