(ایلیا عربی B)

۱)
$64 = \sqrt{(a_1 \cdot a_4)^3} \Rightarrow a^3 q^3 = 64 \to aq = 4$

$\frac{4}{q} + 4q = 17 \Rightarrow \boxed{q = 4}, a = 1.$

۲)
$x^4 + 2x^2 - 8 = 4x^2 \to x^4 - 2x^2 - 8 = 0 \to x = \pm 2 \xrightarrow{\text{نزولی}} x = 2$

دنباله $\to 8, 4, 2, \ldots \longrightarrow S_7 = 8\left(\frac{1-(\frac{1}{2})^7}{\frac{1}{2}}\right) = 16 - (\frac{1}{2})^3 = 15\frac{7}{8} = \frac{127}{8}$

۳)
$q + q^2 + q^3 + q^4 = \frac{40}{81} \Rightarrow q = \frac{1}{3} \quad S_5 = 3^5\left(\frac{1-(\frac{1}{3})^5}{\frac{2}{3}}\right) = 363$

۴)
$2^6 q^6 = q = \pm 2 \to A = a_4 = +8$ یا -8

$d = \frac{42}{4} = \frac{21}{2} \to B = t_4 = 32.5 \Rightarrow A + B = 40.5$ یا 24.5

۵)
$d = \frac{1}{2} \Rightarrow a_{101} = -24 + 25 = 1$

$\Rightarrow t_8 = 1$ در دنباله‌ی هندسی $, t_8 = 2^7 \Rightarrow \boxed{q = \frac{1}{2}}$

۶)
$(a+2d)(a+8d) = (a+6d)^2 \to a^2 + 10ad + 16d^2 = a^2 + 12ad + 36d^2$

$-2ad - 20d^2 = 0 \to ad + 10d^2 = 0 \longrightarrow d = 0, d = \frac{-a}{10}$

۷)
$(a+d)(a+7d) = (a+3d)^2 \to 2ad - 2d^2 = 0 \Rightarrow a = d$

$q = \frac{b_2}{b_1} = \frac{4d}{2d} = 2 \Rightarrow b_7 = \frac{1}{2} \times 2^9 = 2^7 = 128$

۸)
$2aq + aq^3 = 4aq^2 \xrightarrow{q \neq 0} \boxed{q = 2 + \sqrt{2}}, \boxed{q = 2 - \sqrt{2}}$

۹)
$a_4 = \frac{5}{4} \quad a_8 = \frac{1}{4} \quad a_{12} = -1 \to (x + \frac{5}{4})(x - 1) = (x + \frac{1}{4})^2$

$\Rightarrow \frac{-x}{4} - \frac{21}{16} = 0 \Rightarrow \frac{-21}{4}$ دنباله $\to -4 \quad -5 \quad \frac{-25}{4} \Rightarrow q = \frac{5}{4}$

۱۰)
$2a + 10d = 73$

$aq^3 = a + d \longrightarrow 1 + q^3 + q^6 = 73 \Rightarrow q = 2$

(ب) $\boxed{d = 7}$