

$$a_1 = 40 \quad a_4 = 41 \quad d = \frac{41 - 40}{4 - 1} = 1 \Rightarrow a_n = 1n + 39$$

$$1n + 39 = 40 \Rightarrow 1n = 1 \Rightarrow n = 1$$

جمله اول

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$$101, 101, 115, 122, \dots$$

$$a_n = 1n + 94 \rightarrow 1n + 94 \leq 999 \Rightarrow 1n \leq 905 \Rightarrow n = 905$$

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$$(a_3 + a_4 + a_5) - (a_2 + a_3 + a_4) = a_5 - a_2 = -4 \Rightarrow d = \frac{-4}{5 - 2} = -1$$

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$$a_2 + a_3 + a_4 = 9 \Rightarrow (a_2 - d) + a_2 + (a_2 + d) = 9 \Rightarrow 3a_2 = 9 \Rightarrow a_2 = 3$$

$$a_1 = a_2 + d = 3 - 1 = 2 \quad a_1 + a_{14} = 2 + 12 = 14$$

$$a_{14} = a_1 + 13d = 2 + 13(-1) = -11$$

$$a_3 = 2^3 - 1$$

$$a_1 = 2^1 - 1$$

$$a_{13} = 2^{13} - 1$$

$$x=2 \rightarrow a_3 = 2^3 - 1 = 7$$

$$a_1 = 2^1 - 1 = 1$$

$$a_{13} = 2^{13} - 1 = 8191$$

$$\Rightarrow 2^{13} - 1 + 2^1 - 1 = 2 \times 2^{13+1} \Rightarrow 2^{13} + 2^1 - 2 = 2^{14} \Rightarrow 2^{13} + 2^1 - 2 = 2^{14}$$

$$\Rightarrow (2^{13})^2 + 2^1 - 2^{13+2} - 2 = 0 \Rightarrow (2^{13})^2 - 2(2^{13}) - 2 = 0 \Rightarrow (2^{13} - 4)(2^{13} + 1)$$

$$a_3 + a_1 + a_{13} = 7 + 1 + 8191 = 8200$$

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$$a_{10} + a_{12} = 20 \quad a_{12} - a_{10} = 6 \Rightarrow 2a_{11} = 26 \Rightarrow a_{11} = 13 \Rightarrow a_{10} = 7 \Rightarrow d = \frac{13 - 7}{2} = 3$$

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$$a_{21} = a_{10} + 11d = 7 + 11(3) = 40$$

$$\frac{r}{r} (ra_1 + fd) = \frac{r}{r} (ra_1 + fd) \Rightarrow ra_1 + fd = ra_1 + fd$$

$$\Rightarrow fa_1 = rd \Rightarrow ra_1 = d$$

$$\frac{ar}{a_1} = \frac{a_1 + d}{a_1} = \frac{a_1 + ra_1}{a_1} = r \quad \checkmark$$

$$t_n = t_{n-r} + 1 \Rightarrow t_f = t_1 + 1 \Rightarrow \frac{t_f - t_1 + rd}{rd} = 1 \Rightarrow d = 1$$

$$\frac{t_q - t_0}{t_v} = \frac{(t_q + t_0)(t_q - t_0)}{t_v} \Rightarrow \frac{r t_v (t_q - t_0)}{t_v} = r(t_q - t_0) \xrightarrow{t_q - t_0 = fd}$$

$$r(fd) = r(r_0) = f_0 \quad \checkmark$$

$$d = \frac{r + \sqrt{r} - r(1 - \sqrt{r})}{1r + 1} = \frac{r + \sqrt{r} - r + r\sqrt{r}}{1r} = \frac{r\sqrt{r}}{1r} = \sqrt{r} \quad \checkmark$$

$$d = \frac{r_0 - r}{r_0 - r + 1} = \frac{r_0}{r_0 - r}$$

$$\Rightarrow d = d \Rightarrow \frac{r_0}{r_0 - r} = \frac{q}{n} \Rightarrow r_0 n - 1 = r_0 n$$

$$\Rightarrow qn = 1$$

$$\Rightarrow n = r \quad \checkmark$$

$$a_r + a_{1r} = a_n + a_{n+r} \Rightarrow r + 1r = n + n + r \Rightarrow n = 1$$

$$a_n = r a_{\frac{n}{r}} \xrightarrow{n=1} a_1 = r a_r \Rightarrow a_1 + rd = r(a_1 + rd) \Rightarrow a_1 + rd = r a_1 + r d$$

$$\Rightarrow r a_1 = rd \Rightarrow a_1 = -d$$

$$a_1 + (n-1)d = 0 \xrightarrow{a_1 = -d} -d + nd - d = 0 \Rightarrow nd = rd \Rightarrow n = r \rightarrow p > r \quad \checkmark$$