

1) $t_1 = 1^3 - 1 = 0 > t_2 = 2^3 - 1 = 7, t_3 = 3^3 - 1 = 26$

$t_4 = 4^3 - 1 = 63, t_5 = 5^3 - 1 = 124 \rightarrow 7, 26, 63, 124$

2) $t_1 = \frac{1 \times 1 + 1}{1 + 1} = \frac{2}{2} = 1 > t_2 = \dots \rightarrow \frac{2}{3}, \frac{3}{4}, 1, \frac{4}{5}, \frac{5}{6}$

3) $t_{13} = \frac{(-1)^{13}}{\sqrt{13+13}} = \frac{-1}{\sqrt{26}} = \boxed{\frac{-1}{\sqrt{26}}}$

4) $t_{13} = 13 \times 13 - \left\lfloor \frac{13}{2} \right\rfloor = 169 - 6 = \boxed{163}$
 $\left\lfloor \frac{13}{2} \right\rfloor = \left\lfloor 6.5 \right\rfloor = 6$

5) $n-10 < 0 \rightarrow n < 10 \rightarrow 1 \leq n \leq 9 \rightarrow \boxed{[1, 9]}$

6) $n^2 - 12n + 35 < 0 \rightarrow (n-5)(n-7) < 0 \rightarrow \begin{matrix} + & - & + \\ - & 5 & 7 & - \\ + & - & + \end{matrix} \rightarrow 5 < n < 7 \rightarrow \boxed{(5, 7)}$

7) $n^2 - 14 \leq 0 \rightarrow n \leq 4 \rightarrow 1 \leq n \leq 4 \rightarrow \boxed{[1, 4]}$

8) $n^2 - 12n + 35 \leq 0 \rightarrow (n-5)(n-7) \leq 0 \rightarrow \begin{matrix} + & - & + \\ - & 5 & 7 & - \\ + & - & + \end{matrix} \rightarrow 5 \leq n \leq 7 \rightarrow \boxed{[5, 7]}$

$t_2 = 7 > t_3 = 22 \rightarrow \begin{cases} t_2 = a + 3d = 7 \\ t_3 = a + 4d = 22 \end{cases} \rightarrow \begin{cases} a + 3d = 7 \\ a + 4d = 22 \end{cases} \rightarrow \begin{cases} a + 3d = 7 \\ -d = -15 \end{cases} \rightarrow \begin{cases} a = -8 \\ d = 15 \end{cases}$

$t_4 = a + 5d \rightarrow t_4 = -8 + 5 \times 15 = \boxed{67}$

9) $n = \frac{-b}{2a} \rightarrow n = \frac{-9}{1} = \boxed{-9} \rightarrow 9 - 18 + 1 = \boxed{-8}$

10) $n \rightarrow 1 \rightarrow 1+1+1=3 \rightarrow \dots \rightarrow n = \frac{-b}{2a} = \frac{-9}{1} = -9$
 $n \rightarrow 2 \rightarrow 4+2+1=7$
 $n \rightarrow 3 \rightarrow 9+3+1=13$
 $n \rightarrow 4 \rightarrow 16+4+1=21$
 $n \rightarrow 5 \rightarrow 25+5+1=31$
 $n \rightarrow 6 \rightarrow 36+6+1=43$
 $n \rightarrow 7 \rightarrow 49+7+1=57$
 $n \rightarrow 8 \rightarrow 64+8+1=73$
 $n \rightarrow 9 \rightarrow 81+9+1=91$
 $n \rightarrow 10 \rightarrow 100+10+1=111$
 $n \rightarrow 11 \rightarrow 121+11+1=133$
 $n \rightarrow 12 \rightarrow 144+12+1=157$
 $n \rightarrow 13 \rightarrow 169+13+1=183$
 $n \rightarrow 14 \rightarrow 196+14+1=211$
 $n \rightarrow 15 \rightarrow 225+15+1=241$
 $n \rightarrow 16 \rightarrow 256+16+1=273$
 $n \rightarrow 17 \rightarrow 289+17+1=307$
 $n \rightarrow 18 \rightarrow 324+18+1=343$
 $n \rightarrow 19 \rightarrow 361+19+1=381$
 $n \rightarrow 20 \rightarrow 400+20+1=421$
 $n \rightarrow 21 \rightarrow 441+21+1=463$
 $n \rightarrow 22 \rightarrow 484+22+1=507$
 $n \rightarrow 23 \rightarrow 529+23+1=553$
 $n \rightarrow 24 \rightarrow 576+24+1=601$
 $n \rightarrow 25 \rightarrow 625+25+1=651$
 $n \rightarrow 26 \rightarrow 676+26+1=703$
 $n \rightarrow 27 \rightarrow 729+27+1=757$
 $n \rightarrow 28 \rightarrow 784+28+1=813$
 $n \rightarrow 29 \rightarrow 841+29+1=869$
 $n \rightarrow 30 \rightarrow 900+30+1=931$
 $n \rightarrow 31 \rightarrow 961+31+1=993$
 $n \rightarrow 32 \rightarrow 1024+32+1=1057$
 $n \rightarrow 33 \rightarrow 1089+33+1=1123$
 $n \rightarrow 34 \rightarrow 1156+34+1=1191$
 $n \rightarrow 35 \rightarrow 1225+35+1=1261$
 $n \rightarrow 36 \rightarrow 1296+36+1=1333$
 $n \rightarrow 37 \rightarrow 1369+37+1=1407$
 $n \rightarrow 38 \rightarrow 1444+38+1=1483$
 $n \rightarrow 39 \rightarrow 1521+39+1=1561$
 $n \rightarrow 40 \rightarrow 1600+40+1=1641$
 $n \rightarrow 41 \rightarrow 1681+41+1=1723$
 $n \rightarrow 42 \rightarrow 1764+42+1=1807$
 $n \rightarrow 43 \rightarrow 1849+43+1=1893$
 $n \rightarrow 44 \rightarrow 1936+44+1=1981$
 $n \rightarrow 45 \rightarrow 2025+45+1=2071$
 $n \rightarrow 46 \rightarrow 2116+46+1=2163$
 $n \rightarrow 47 \rightarrow 2209+47+1=2257$
 $n \rightarrow 48 \rightarrow 2304+48+1=2353$
 $n \rightarrow 49 \rightarrow 2401+49+1=2451$
 $n \rightarrow 50 \rightarrow 2500+50+1=2551$
 $n \rightarrow 51 \rightarrow 2601+51+1=2653$
 $n \rightarrow 52 \rightarrow 2704+52+1=2757$
 $n \rightarrow 53 \rightarrow 2809+53+1=2863$
 $n \rightarrow 54 \rightarrow 2916+54+1=2971$
 $n \rightarrow 55 \rightarrow 3025+55+1=3081$
 $n \rightarrow 56 \rightarrow 3136+56+1=3193$
 $n \rightarrow 57 \rightarrow 3249+57+1=3307$
 $n \rightarrow 58 \rightarrow 3364+58+1=3423$
 $n \rightarrow 59 \rightarrow 3481+59+1=3541$
 $n \rightarrow 60 \rightarrow 3600+60+1=3661$
 $n \rightarrow 61 \rightarrow 3721+61+1=3783$
 $n \rightarrow 62 \rightarrow 3844+62+1=3907$
 $n \rightarrow 63 \rightarrow 3969+63+1=4033$
 $n \rightarrow 64 \rightarrow 4096+64+1=4163$
 $n \rightarrow 65 \rightarrow 4225+65+1=4291$
 $n \rightarrow 66 \rightarrow 4356+66+1=4423$
 $n \rightarrow 67 \rightarrow 4489+67+1=4557$
 $n \rightarrow 68 \rightarrow 4624+68+1=4693$
 $n \rightarrow 69 \rightarrow 4761+69+1=4831$
 $n \rightarrow 70 \rightarrow 4900+70+1=4971$
 $n \rightarrow 71 \rightarrow 5041+71+1=5113$
 $n \rightarrow 72 \rightarrow 5184+72+1=5257$
 $n \rightarrow 73 \rightarrow 5329+73+1=5403$
 $n \rightarrow 74 \rightarrow 5476+74+1=5551$
 $n \rightarrow 75 \rightarrow 5625+75+1=5701$
 $n \rightarrow 76 \rightarrow 5776+76+1=5853$
 $n \rightarrow 77 \rightarrow 5929+77+1=6007$
 $n \rightarrow 78 \rightarrow 6084+78+1=6163$
 $n \rightarrow 79 \rightarrow 6241+79+1=6321$
 $n \rightarrow 80 \rightarrow 6400+80+1=6481$
 $n \rightarrow 81 \rightarrow 6561+81+1=6643$
 $n \rightarrow 82 \rightarrow 6724+82+1=6807$
 $n \rightarrow 83 \rightarrow 6889+83+1=6973$
 $n \rightarrow 84 \rightarrow 7056+84+1=7143$
 $n \rightarrow 85 \rightarrow 7225+85+1=7311$
 $n \rightarrow 86 \rightarrow 7396+86+1=7483$
 $n \rightarrow 87 \rightarrow 7569+87+1=7657$
 $n \rightarrow 88 \rightarrow 7744+88+1=7833$
 $n \rightarrow 89 \rightarrow 7921+89+1=8011$
 $n \rightarrow 90 \rightarrow 8100+90+1=8191$
 $n \rightarrow 91 \rightarrow 8281+91+1=8373$
 $n \rightarrow 92 \rightarrow 8464+92+1=8557$
 $n \rightarrow 93 \rightarrow 8649+93+1=8743$
 $n \rightarrow 94 \rightarrow 8836+94+1=8931$
 $n \rightarrow 95 \rightarrow 9025+95+1=9121$
 $n \rightarrow 96 \rightarrow 9216+96+1=9313$
 $n \rightarrow 97 \rightarrow 9409+97+1=9507$
 $n \rightarrow 98 \rightarrow 9604+98+1=9703$
 $n \rightarrow 99 \rightarrow 9801+99+1=9901$
 $n \rightarrow 100 \rightarrow 10000+100+1=10101$

$t_n = -16, -13, -10, -7, -4, \dots \rightarrow \begin{cases} 1a = 2 \rightarrow a = 1 \\ 1a + b = -16 \rightarrow b = -18 \\ a + b + c = -16 \rightarrow 1 - 18 + c = -16 \rightarrow c = 1 \end{cases}$

$t_n = an^2 + bn + c \rightarrow n^2 - 4n + 1 \rightarrow t_{10} = 10^2 - (4 \times 10) + 1 = 100 - 40 + 1 = \boxed{61}$

$t_n = -4, -1, 2, 5, \dots \rightarrow \begin{cases} 1a = 1 \rightarrow a = 1 \\ 1a + b = -4 \rightarrow 1 + b = -4 \rightarrow b = -5 \\ a + b + c = -4 \rightarrow 1 - 5 + c = -4 \rightarrow c = -4 \end{cases}$

$t_n = an^2 + bn + c = \boxed{t_n = n^2 - 5n - 4}$

* $a + 1 = 1a + 1 \rightarrow a = 1, a + 1 \geq 1a + 1 \rightarrow 1 \geq a \rightarrow a = (-\infty, 1]$

11) $n = \frac{99-13}{1} + 1 = \boxed{87}$

12) $n(A \cup B) = n(A) + n(B) - n(A \cap B) = 13 + 10 - 4 = \boxed{19}$