"Sequences Homework"

• General Sequence

① $a_n = \frac{n+4}{n}$

$a_1 = \frac{1+4}{1} = 5$

$a_2 = \frac{2+4}{2} = 3$

$a_3 = \frac{3+4}{3} = \frac{7}{3}$

$a_4 = \frac{4+4}{4} = 2$

$a_5 = \frac{5+4}{5} = \frac{9}{5}$

$a_6 = \frac{6+4}{6} = \frac{10}{6} = \frac{5}{3}$

$5, 3, \frac{7}{3}, 2, \frac{9}{5}, \frac{5}{3}$

② $a_n = \frac{n^2}{n+1}$

$a_1 = \frac{1^2}{1+1} = \frac{1}{2}$

$a_2 = \frac{2^2}{2+1} = \frac{4}{3}$

$a_3 = \frac{3^2}{3+1} = \frac{9}{4}$

$a_4 = \frac{4^2}{4+1} = \frac{16}{5}$

$a_5 = \frac{5^2}{5+1} = \frac{25}{6}$

$a_6 = \frac{6^2}{6+1} = \frac{36}{7}$

$\frac{1}{2}, \frac{4}{3}, \frac{9}{4}, \frac{16}{5}, \frac{25}{6}, \frac{36}{7}$

③ $a_n = (n+1)^3$

$a_1 = (1+1)^3 = 8$

$a_2 = (2+1)^3 = 27$

$a_3 = (3+1)^3 = 64$

$a_4 = (4+1)^3 = 125$

$a_5 = (5+1)^3 = 216$

$a_6 = (6+1)^3 = 343$

8, 27, 64, 125, 216, 343

④ $a_n = \frac{1}{2} + \frac{1}{2}(n-1)$

⑤ $a_n = 1 + 3(n-1)$

⑥ $a_n = 4 - 1(n-1)$

⑦ $a_n = 5 + 2(n-1)$

⑧ $a_n = 3 + 4(n-1)$

⑨ $a_n = (n+1)^2$

Arithmetic Sequence

① $a_n = 1 - 4(n-1)$

$a_{30} = 1 - 4(30-1) = -115$

② $a_n = -2 + 2.5(n-1)$

$a_{30} = -2 + 2.5(30-1)$

$a_{30} = 70.5$

③ $a_n = 2.5 - .3(n-1)$

$a_{30} = 2.5 - 3(30-1)$

$a_{30} = 2.5 - 3(29)$

$a_{30} = -84.5$

④ $a_n = 5 + 3.4(n-1)$

$a_{30} = 5 + 3.4(30-1)$

$a_{30} = 103.6$

⑤ $a_n = \frac{9}{4} + \frac{1}{4}(n-1)$

$a_{30} = \frac{9}{4} + \frac{1}{4}(30-1)$

$a_{30} = 9.5$

⑥ $a_n = \frac{-5}{3} + \frac{2}{3}(n-1)$

$a_{30} = \frac{-5}{3} + \frac{2}{3}(30-1)$

$a_{30} = \frac{53}{3}$

⑦ $a_n = 16 + .2(n-1)$

⑧ $a_n = 12 + \frac{2}{3}(n-1)$

⑨ $a_{10} = a_1 - 4(10-1)$

$2 = a_1 - 36$

$38 = a_1$

$a_n = 38 - 4(n-1)$

(10) $a_n = a_1 + d(n-1)$

$a_{13} = a_6 + d(13-6)$

$44 = 27.2 + d(7)$

$16.8 = 7d$

$2.4 = d$

$a_6 = a_1 + 2.4(6-1)$

$27.2 = a_1 + 12$

$39.2 = a_1$

$\boxed{a_n = 39.2 + 2.4(n-1)}$

(11) $a_{24} = a_{15} + d(24-15)$

$-16 = -19 + d(9)$

$3 = 9d$

$\frac{1}{3} = d$

$a_{15} = a_1 + \frac{1}{3}(15-1)$

$-19 = a_1 + \frac{14}{3}$

$-\frac{71}{3} = a_1$

$\boxed{a_n = -\frac{71}{3} + \frac{1}{3}(n-1)}$

(12) $a_{18} = a_8 + d(18-8)$

$-50.8 = -24.8 + d(10)$

$-26 = 10d$

$-2.6 = d$

$a_8 = a_1 + (-2.6)(8-1)$

$-24.8 = a_1 - 18.2$

$-6.6 = a_1$

$\boxed{a_n = -6.6 - 2.6(n-1)}$

Geometric Sequences

(1) $\boxed{r = -3}$

(2) $2r = \frac{1}{2}$

$\boxed{r = -\frac{1}{4}}$

(3) $\frac{1}{7}7r = \frac{21}{4}\frac{1}{7}$

$\boxed{r = \frac{3}{4}}$

(4) $-3r = \frac{3}{4}$

$r = -\frac{1}{4}$

(5) $2r = -.8$

$r = -.4$

$\boxed{a_n = 2(-.4)^{n-1}}$

$a_8 = 2(-.4)^{8-1}$

$\boxed{a_8 \approx -.003}$

$\boxed{a_n = -3(-\frac{1}{4})^{n-1}}$

$a_8 = -3(-\frac{1}{4})^{8-1}$

$\boxed{a_8 \approx 1.83 \times 10^{-4}}$

(6) $\boxed{a_n = 7(4)^{n-1}}$

$a_8 = 7(4)^{8-1}$

$\boxed{a_8 = 114{,}688}$

(7) $a_n = 5(1.1)^{n-1}$

(8) $a_7 = a_3(r)^{7-3}$

$-\frac{1}{4} = -64r^4$

$\sqrt{\frac{1}{256}} = \sqrt{r^4}$

$\pm\frac{1}{4} = r$

$\boxed{a_n = -1024(\frac{1}{4})^{n-1}}$ or $\boxed{a_n = -1024(\frac{1}{4})^{n-1}}$

(9) $a_{15} = a_8 r^{15-8}$

$243 = \frac{1}{9}r^7$

$2187 = r^7$

$\boxed{a_n = \frac{1}{19683}(3)^{n-1}}$

$a_8 = a_1 r^{8-1}$

$\frac{1}{9} = a_1(3)^7$

$\frac{1}{[illegible]} = a_1$