Assignment 6: Part 1: *5.6*: 2, 4

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2. $b_k = b_{k-1} + 3k$, for all integers $k \geq 2$, $b_1 = 1$

$b_1 = 1$

$b_1 = 1$
$b_2 = b_1 + 3(2) = 7$
$b_3 = b_2 + 3(3) = 16$
$b_4 = b_3 + 3(4) = 28$

1, 7, 16, 28

4. $d_k = k(d_{k-1})^2$ for all integers $k \geq 1$ $d_0 = 3$

$d_0 = 3$

$d_1 = 1(d_0)^2 = (3)^2 = 9$
$d_2 = 2(d_1)^2 = 2(9)^2 = 162$
$d_3 = 3(d_2)^2 = 2(162)^2 = 78,732$

3, 9, 162, 78732

Assignment 6: Part 1: 5.7: 4, 6, 7

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4. $b_k = \frac{b_{k-1}}{1+b_{k-1}}$, for all integers $k \geq 1$ $b_0 = 1$

$b_0 = 1$

$b_1 = \frac{b_0}{1+b_0} = \frac{1}{1+1} = \frac{1}{2}$

$b_2 = \frac{b_1}{1+b_1} = \frac{\frac{1}{2}}{\frac{3}{2}} = \frac{2}{3}\left(\frac{1}{2}\right) = \frac{2}{6} = \frac{1}{3}$

$\boxed{a_n = \frac{1}{n+1}}$

$b_3 = \frac{b_2}{1+b_2} = \frac{\frac{1}{3}}{1+\frac{1}{3}} = \frac{\frac{1}{3}}{\frac{4}{3}} = \frac{3}{4}\left(\frac{1}{3}\right) = \frac{3}{12} = \frac{1}{4}$

$b_4 = \frac{\frac{1}{4}}{1+\frac{1}{4}} = \frac{\frac{1}{4}}{\frac{5}{4}} = \frac{4}{5}\left(\frac{1}{4}\right) = \frac{4}{20} = \frac{1}{5}$

6. $d_k = 2d_{k-1} + 3$, for all integers $k \geq 2$

$d_1 = 2$

$d_1 + d_2 + d_3 + d_4 + \ldots$

$d_1 = 2$

$d_2 = 2(2) + 3 = 2^2 + 3$

$d_3 = 2(2^2 \; 3) + 3 = 2^3 + 2\cdot3 + 3$

$d_4 = 2(2^3 + 2\cdot3 + 3) + 3 = 2(2^3) + 2^2\cdot3 + 2\cdot3 + 3$

$= 2^4 + 3(2^2 + 2 + 1)$

$= 2^k + 3(2^{k-2} + \ldots + 2 + 1)$

$\frac{r^{n+1} - 1}{r-1}$

$= 2^k + 3\left(\frac{2^{k-2+1} - 1}{2-1}\right)$

$= 2^k + 3(2^{k-1} - 1)$

$= 2\cdot2^{k-1} + 3\cdot2^{k-1} - 1$

$\boxed{d_k = 5\cdot2^{k-1} - 1}$

Assignment 6: Part 1: 5.7: 4, 6, 7

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7. $e_k = 4e_{k-1} + 5$, for all integers $k \geq 1$ $e_0 = 2$

$e_0 = 2$ $a_n = a_0 + dn$

$e_1 = (4 \cdot 2 + 5) = 4^1 \cdot 2 + 5$

$e_2 = 4(4 \cdot 2 + 5) + 5 = 4^2 \cdot 2 + 4 \cdot 5 + 5$

$e_3 = 4((4^2 \cdot 2) + (4 \cdot 5) + 5) + 5 = (4^3 \cdot 2) + (4^2 \cdot 5 + 4 \cdot 5 + 5)$

$= 2 \cdot 4^k + 5(4^{k-1} + 4 + 1)$

$\frac{r^{n+1} - 1}{r - 1}$

$= 2 \cdot 4^k + 5\left(\frac{4^k - 1}{3}\right)$

$= 2 \cdot 4^k + \frac{5 \cdot 4^k - 5}{3}$

$= \frac{6 \cdot 4^k + 5 \cdot 4^k - 5}{3}$

$$\boxed{e_k = \frac{11 \cdot 4^k - 5}{3}}$$

Assignment 6: Part 1: 5.7: 4, 6, 7

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7. $e_k = 4e_{k-1} + 5$, for all integers $k \geq 1$ $e_0 = 2$

$e_0 = 2$

$a_n = a_0 + dn$

$e_1 = (4 \cdot 2 + 5) = 4^1 \cdot 2 + 5$

$e_2 = 4(4 \cdot 2 + 5) + 5 = 4^2 \cdot 2 + 4 \cdot 5 + 5$

$e_3 = 4((4^2 \cdot 2) + (4 \cdot 5) + 5) + 5 = (4^3 \cdot 2) + (4^2 \cdot 5 + 4 \cdot 5 + 5)$

$= 2 \cdot 4^k + 5(4^{k-1} + 4 + 1)$

$\frac{r^{n+1} - 1}{r - 1}$

$= 2 \cdot 4^k + 5\left(\frac{4^k - 1}{3}\right)$

$= 2 \cdot 4^k + \frac{5 \cdot 4^k - 5}{3}$

$= \frac{6 \cdot 4^k + 5 \cdot 4^k - 5}{3}$

$\boxed{e_k = \frac{11 \cdot 4^k - 5}{3}}$