HW 3.2

(4.) a) $a_0 = (-2)^0 = 1$, $a_1 = (-2)^1 = -2$, $a_2 = (-2)^2 = 4$, $a_3 = (-2)^3 = -8$
b) $a_0 = a_1 = a_2 = a_3 = 3$
c) $a_0 = 7 + 4^0 = 8$, $a_1 = 7 + 4^1 = 11$, $a_2 = 7 + 4^2 = 23$, $a_3 = 7 + 4^3 = 71$
d) $a_0 = 2^0 + (-2)^0 = 2$, $a_1 = 2^1 + (-2)^1 = 0$, $a_2 = 2^2 + (-2)^2 = 8$, $a_3 = 2^3 + (-2)^3 = 0$.

(16) a) The terms of this sequence alternate between 2 (if j is even) and 0 (if j is odd). Thus the sum is $2+0+2+0+2+0+2+0+2 = 10$.
b) We can break this into two parts and compute $(\sum_{j=0}^{8} 3^j) - (\sum_{j=0}^{8} 2^j)$. Each summation can be computed from the formula for the sum of a geometric progression. Thus the answer is

$$\frac{3^9 - 1}{3 - 1} - \frac{2^9 - 1}{2 - 1} = 9841 - 511 = 9330\,.$$

c) As in part (b) we can break this into two parts and compute $(\sum_{j=0}^{8} 2\cdot 3^j) + (\sum_{j=0}^{8} 3\cdot 2^j)$. Each summation can be computed from the formula for the sum of a geometric progression. Thus the answer is

$$\frac{2\cdot 3^9 - 2}{3 - 1} + \frac{3\cdot 2^9 - 3}{2 - 1} = 19682 + 1533 = 21215\,.$$

d) This could be worked as in part (b), but it is easier to note that the sum telescopes (see Exercise 19). Each power of 2 cancels except for the -2^0 when $j = 0$ and the 2^9 when $j = 8$. Therefore the answer is $2^9 - 2^0 = 511$. (Alternatively, note that $2^{j+1} - 2^j = 2^j$.)

(24.) This exercise is like Example 15. From Table 2 we know that $\sum_{k=1}^{200} k^3 = 200^2 \cdot 201^2/4 = 404{,}010{,}000$, and $\sum_{k=1}^{98} k^3 = 98^2 \cdot 99^2/4 = 23{,}532{,}201$. Therefore the desired sum is $404{,}010{,}000 - 23{,}532{,}201 = 380{,}477{,}799$.