

2.4 | 4

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

ERIC ROUSE
ASSIGN 3.3

#58

P1/2

13 5

$$a) \sum_{k=1}^5 (k+1) = \sum_{k=1}^5 (k) + \sum_{k=1}^5 (1) = \frac{(5+1)5}{2} + 5 = 15 + 5 = \underline{20}$$

$$b) \sum_{k=0}^4 (-2)^k \Rightarrow r = -2 \Rightarrow \frac{(-2)^{(4+1)} - 1}{-2 - 1} = \frac{(-2)^5 - 1}{-3} = \frac{-32 - 1}{-3} = \frac{-33}{-3} = \underline{11}$$

$$c) \sum_{k=1}^{10} 3 = 3 \cdot 10 = \underline{30}$$

$$d) \sum_{j=0}^8 2^j 2 - \sum_{j=0}^8 2^j = 2 \sum_{j=0}^8 2^j - \sum_{j=0}^8 2^j = \sum_{j=0}^8 2^j = \frac{2^{8+1} - 1}{2 - 1} = \frac{2^9 - 1}{1} = \underline{511}$$

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$$a) \sum_{j=0}^8 3 \cdot 2^j = 3 \left(\frac{2^{8+1} - 1}{2 - 1} \right) = 3 \left(\frac{2^9 - 1}{1} \right) = \underline{1533}$$

$$b) \sum_{j=0}^7 2^{j+1} = \frac{1}{2} \sum_{j=0}^7 2^j = 2 \left(\frac{2^8 - 1}{2 - 1} \right) = 2(255) = \underline{510}$$

$$c) \sum_{j=0}^6 (-3)^{(j+2)} = (-3)^2 \sum_{j=0}^6 (-3)^j = 9 \left(\frac{(-3)^{6+1} - 1}{-3 - 1} \right) = 9 \left(\frac{-2188}{-4} \right) = \underline{4923}$$

$$d) \sum_{j=0}^8 (2)(-3)^j = 2 \left(\frac{-3^{8+1} - 1}{-3 - 1} \right) = 2 \left(\frac{-19684}{-4} \right) = \underline{9842}$$

16

$$a) \sum_{j=0}^8 (1 + (-1)^j) = \sum_{j=0}^8 1 + \sum_{j=0}^8 (-1)^j = 8 + \left(\frac{(-1)^{8+1} - 1}{-1 - 1} \right) = 8 + \frac{-1 - 1}{-1 - 1} = \underline{9}$$

$$b) \sum_{j=0}^8 3^j - \sum_{j=0}^8 2^j = \frac{3^9 - 1}{3 - 1} - \frac{2^9 - 1}{2 - 1} = 9841 - 511 = \underline{9330}$$

$$c) 2 \sum_{j=0}^8 3^j + 3 \sum_{j=0}^8 2^j = 2 \left(\frac{3^9 - 1}{3 - 1} \right) + 3 \left(\frac{2^9 - 1}{2 - 1} \right) = 2(9841) + 3(511) = \underline{18149}$$

$$d) 2 \sum_{j=0}^8 2^j - \sum_{j=0}^8 2^j = \sum_{j=0}^8 2^j = \frac{2^9 - 1}{2 - 1} = \underline{511}$$

$$18) a) \sum_{i=1}^2 \sum_{j=1}^3 (i+j) = \sum_{i=1}^2 (i+1) + (i+2) + (i+3) = 3 \sum_{i=1}^2 (i+2) = 3 \left(\frac{(2+1)2}{2} \right) + 3(2+2)$$

$$3i+6$$

$$= 3[(1+2) + (2+2)] = 21 \quad \text{or } 9+12 = 21$$

$$b) \sum_{i=0}^3 \sum_{j=0}^2 (3i+2j) = \sum_{i=0}^3 (3i+1 + 3i+2 + 3i+4) = \sum_{i=0}^3 9i+7 = (0+7 + 9+7 + 18+7 + 27+7) = 83$$

$$c) \sum_{i=1}^3 \sum_{j=0}^2 j = \sum_{i=1}^3 (0+1+2) = \sum_{i=1}^3 3 = 9$$

$$d) \sum_{i=0}^2 \sum_{j=0}^3 i^2 j^3 = \sum_{i=0}^2 (0i^2 + 1i^2 + 8i^2 + 27i^2) = 36i^2$$

$$= 36(0)^2 + 36(1)^2 + 36(2)^2 = 180$$

$$20) \frac{1}{k(k+1)} = \frac{1}{k} - \frac{1}{k+1}$$

$$\sum_{k=1}^n \frac{1}{k(k+1)}$$

$$a_k = \frac{1}{k} \quad a_{k+1} = \frac{1}{k+1}$$

$$\left(\frac{1}{1(2)} + \frac{1}{2(3)} + \frac{1}{3(4)} + \frac{1}{4(5)} + \frac{1}{5(6)} \right)$$

$$\frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20}$$

$$\sum_{k=1}^n = (a_k - a_{k+1}) \quad a_k = \frac{1}{k}$$

$$(a_n - a_{n+1}) + (a_{n-1} - a_n) + \dots + (a_2 - a_3) + (a_1 - a_2)$$

$$\Rightarrow \text{everything cancels except } a_1 - a_{n+1}$$

$$\Rightarrow a_1 - a_{n+1} = 1 - \frac{1}{n+1}$$

$$24) \sum_{k=99}^{200} k^3 = \sum_{k=1}^{200} k^3 - \sum_{k=1}^{98} k^3$$

$$= \frac{200^2(200+1)^2}{4} - \frac{98^2(98+1)^2}{4}$$

$$= 404010000 - 23532201$$

$$380477799$$