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CS 225

Lecture 3.3 (Sequences and Sum)

Assignment 2.4 (7th Edition): ={ 4, 29 (show work), 31(show work), 32, 34, 36, 40}

4) a) $(-2)^n$: $a_0 = 1, a_1 = -2, a_2 = 4, a_3 = -8$

b) 3: $a_0 = 3, a_1 = 3, a_2 = 3, a_3 = 3$

c) $7 + 4^n = a_0 = 8, a_1 = 11, a_2 = 23, a_3 = 71$

d) $2^n + (-2)^n$: $a_0 = 2, a_1 = 0, a_2 = 8, a_3 = 0$

29) a) $\sum_{k=1}^{5}(k+1)$: k_1: 1+1 = 2 k_2: 2+1 = 3, k_3 : 3+1 = 4, k_4 : 4+1 = 5, k_5 : 5+1 = 6

Sum = 2+3+4+5+6 = 20

b) $\sum_{j=0}^{4}(-2^j)$ = 1 + -2 + 4 + -8 + 16 = 11

c) $\sum_{i=1}^{10} 3$ = 3+3+3+3+3+3+3+3+3+3 = 30

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

31) a) $\sum_{j=1}^{8} 3 * (2^j) = 3 * \frac{(2^9 - 2^0)}{2-1}$ = 3 x 511 = 1533

b) $\sum_{j=1}^{8}(2^j) = \sum_{j=0}^{8}(2^j) - \sum_{j=0}^{0}(2^j)$ = $\frac{(2^9-2^0)}{2-1}$ - $\frac{(2^1-2\text{^}0)}{2-1}$ = 511 - 1 = 510

c) $\sum_{j=2}^{8}(-3)^j$ = $\sum_{j=0}^{8}(-3^j) - \sum_{j=0}^{1}(-3^j)$ = $\frac{(-3^9 - -3^0)}{-3-1}$ - $\frac{(-3^2 - -3^0)}{-3-1}$ = 4923

d) $\sum_{j=0}^{8} 2 * (-3^j)$ = $2 * \frac{(-3^9 - -3^0)}{-3-1}$ = 2 * 4921 = 9842

32) a) $\sum_{j=0}^{8}(1+(-1)^j)$ = (9 * 1) + (1 + -1 + 1 + -1 + 1 +-1 + 1 + -1) = (9 * 1) + 1 = 10

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

c) $\sum_{j=0}^{8}(2*3^j + 3*2^j)$ = 2($\frac{(-3^9 - -3^0)}{-3-1}$) + 3($\frac{(2^9-2^0)}{2-1}$) = 2(9841) + 3(511) = 21215

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

34. a) $\sum_{i=1}^{3}\sum_{j=1}^{2}(i-j)$ = $\sum_{i=1}^{3}(\sum_{j=1}^{2} i$ - $\sum_{j=1}^{2} j)$ = $2\sum_{i=1}^{3} i - \sum_{i=1}^{3} 3$ = 2(1+2+3) - 3*3 = 3

b) $\sum_{i=0}^{3}\sum_{j=0}^{2}(3i+2j)$ = $\sum_{i=0}^{3}(3*(i+i+i) + 2(0+1+2))$ = 9(0+1+2+3) + 6(1+1+1+1) = 78

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

d) $\sum_{i=0}^{2}\sum_{j=0}^{3}(i^2 j^3)$ = $\sum_{i=0}^{2}(i^2) * (\sum_{j=0}^{3}(j^3))$ = $\sum_{i=0}^{2}(i^2)(1+8+27)$ = 36(1+4) = 180

36) $\sum_{k=1}^{n}\frac{1}{k(k+1)}$ can be donated as $a_k = \frac{1}{k}$. so $\sum_{j=1}^{n}(aj - a(j+1))$ from question 19.

= 1 - $\frac{1}{n+1}$ = $\frac{n}{n+1}$

40) $find$ $\sum_{k=99}^{200}(k^3)$ = $\sum_{k=1}^{200}(k^3) - \sum_{k=1}^{98}(k^3)$ = $\frac{(200^2*201^2)}{4} - \frac{(98^2*99^2)}{4}$ = 380477799