**2.4 Sequences and Summations**

**Q8. Show that the sequence {an} is a solution of the recurrence relation an = −3an−1 + 4an−2 if :**

**a) an = 0.**

−3an−1 + 4an−2 = −3 · 0 + 4 · 0 = 0 = an

**b) an = 1.**

−3an−1 + 4an−2 = −3 · 1 + 4 · 1 = 1 = an

**c) an = .**

−3an−1 + 4an−2 = −3 · + 4·= ((−3)(−4)+4 = ·16 =

= = an

**d) an = 2 + 3.**

−3an−1 + 4an−2 = −3 ( 2 + 3 ) + 4·( 2+ 3 ) = ( (−6)(−4) + 4·2) − 9 + 12 = ·32 + 3 = ·2 + 3

= 2·+ 3 = an

**Q15. For each of these lists of integers, provide a simple formula or rule that generates the terms of an integer sequence that begins with the given list .Assuming that your formula or rule is correct, determine the next three terms of the sequence.**

**a) 1, 0, 1, 1, 0, 0, 1, 1, 1, 0, 0, 0, 1, . . .**

One 1 and one 0, followed by two 1s and two 0s, followed by three 1s and three 0s, and so on

1, 1, 1

**b) 1, 2, 2, 3, 4, 4, 5, 6, 6, 7, 8, 8, . . .**

The positive integers are listed in increasing order with each even positive integer listed twice

9, 10, 10.

**c) 1, 0, 2, 0, 4, 0, 8, 0, 16, 0, . . .**

The terms in odd numbers locations are integer powers of 2and the terms in even-numbered locations are all 0

32, 0, 64.

**d) 3, 6, 12, 24, 48, 96, 192, . . .**

an = 3 ·

384, 768, 1536

**e) 15, 8, 1,−6,−13,−20,−27, . . .**

an = 15 − 7(n − 1) = 22 − 7n

−34, −41, −48

**f ) 3, 5, 8, 12, 17, 23, 30, 38, 47, . . .**

an = ( + n + 4)/2

57, 68, 80

**g) 2, 16, 54, 128, 250, 432, 686, . . .**

an =

1024, 1458, 2000

**h) 2, 3, 7, 25, 121, 721, 5041, 40321, . . .**

an = n! + 1

362881, 3628801, 39916801

**Q20. Compute each of these double sums.**

**a)**

for i=1 (1+1) + (1+2) + (1+3)

+for i=2 (2+1) + (2+2) + (2+3)

2+3+4+3+4+5 = **21**

**b)**

for i=0 (2(0)+3(0)) + (2(0)+3(1)) + (2(0)+3(2)) + (2(0)+3(3))

for i=1 (2(1)+3(0)) + (2(1)+3(1)) + (2(1)+3(2)) + (2(1)+3(3))

for i=2 (2(2)+3(0)) + (2(2)+3(1)) + (2(2)+3(2)) + (2(2)+3(3))

3+6+9+2+5+8+11+4+7+10+15

= 78

**c)**

for i=1, 1+1+1

+for i=2, 2+2+2

+for i=3, 3+3+3

3+6+9 = 18

**d)**

for i=0 ,0

+ for i=1, (1\*1)+(1\*2)+(1\*3)

+ for i=2, (2\*1)+(2\*2)+(2\*3)

1+2+3+2+4+6 = 18