**Chapter 7.1 Arithmetic Sequences Classwork** **Name:** Solutions by Mr. Hagen

1. Determine which sequences are arithmetic. If it is, state the common difference:

a) 1, 5, 9, 13, 17, ...

Yes, $d = 4$

b) 3, 6, 12, 24, ...

no.

c) 3, 7, 13, 17, 23, 27, ...

no.

d) 59, 48, 37, 26, 15, ...

Yes, $d = -11$

2. The 10th term of an arithmetic sequence is 29 and the 11th term is 41. What is the 12th term?

$d = 41 - 29$

$d = 12$

$\therefore t_{12} = 41 + 12 = 53$

3. For each arithmetic sequence, determine the general term $t_n$ and $t_{11}$.

$t_n = a + (n-1)d$

a) 35, 40, 45, ...

$d = 5$, $a = 35$

$t_n = 35 + (n-1)(5)$

$t_n = 35 + 5n - 5$

$t_n = 5n + 30$

$t_{11} = 5(11) + 30$

$t_{11} = 85$

b) 31, 20, 9,...

$d = -11$, $a = 31$

$t_n = 31 + (n-1)(-11)$

$t_n = 31 - 11n + 11$

$t_n = 42 - 11n$

$t_{11} = 42 - 11(11)$

$t_{11} = -79$

c) -29, -41, -53, ...

$d = -12$, $a = -29$

$t_n = -29 + (n-1)(-12)$

$t_n = -29 - 12n + 12$

$t_n = -12n - 17$

$t_{11} = -12(11) - 17$

$t_{11} = -149$

d) 0.4, 0.57, 0.74, ...

$d = 0.17$, $a = 0.4$

$t_n = 0.4 + (n-1)(0.17)$

$t_n = 0.4 + 0.17n - 0.17$

$t_n = 0.17n + 0.23$

$t_{11} = 0.17(11) + 0.23$

$t_{11} = 2.1$

4. Determine the number of terms in each arithmetic sequence. (example 3 in the notes)

a) 7, 9, 11, 13, ... ,63

$d = 2$, $a = 7$, $t_n = 63$

$63 = 7 + (n-1)(2)$

$-7 \quad -7$

$\frac{56}{2} = \frac{(n-1)(2)}{2}$

$28 = n - 1$

$+1 \quad +1$

$29 = n$

b) -20, -25, -30, ... , -205

$d = -5$, $a = -20$, $t_n = -205$

$-205 = -20 + (n-1)(-5)$

$+20 \quad +20$

$\frac{-185}{-5} = \frac{(n-1)(-5)}{-5}$

$37 = n - 1$

$+1 \quad +1$

$38 = n$

c) 9, 16, 23, 30, ... ,100

$d = 7$, $a = 9$, $t_n = 100$

$100 = 9 + (n-1)(7)$

$91 = (n-1)(7)$

$13 = n-1$

$14 = n$

d) 28, 19, 10, 1, ..., -44

$d = -9$, $a = 28$, $t_n = -44$

$-44 = 28 + (n-1)(-9)$

$-72 = (n-1)(-9)$

$8 = n-1$

$9 = n$

5. An opera house has 27 seats in the first row, 34 seats in the second row, 41 seats in the third row, and so on. The last row has 181 seats.

$a = 27$ $d = 7$ $t_n = 181$

a) How many seats are in the 10th row?

$n$

$t_{10} = 27 + (10-1)(7)$

$t_{10} = 27 + 63$

$t_{10} = 90$

b) How many rows of seats are in the opera house?

$181 = 27 + (n-1)(7)$

$154 = (n-1)(7)$

$22 = n-1$

$23 = n$

6. Janice gets a job and starts out earning $9.25/h. Her boss promises her a raise of $0.15/h after each month of work. When will Janice start earning at least twice her starting wage?

$a = 9.25$

$d = 0.15$

$t_n$ = double 9.25 $= 18.5$

$18.5 = 9.25 + (n-1)(0.15)$

$9.25 = (n-1)(0.15)$

$61.\bar{6} = n-1$

$62.\bar{6} = n$

$\therefore$ 62 - 63 months

7. The 50th term of an arithmetic sequence is 238 and the 93rd term is 539. State the general term.

$t_{50} = 238$

$t_{93} = 539$

$539 = a + (93-1)d$

$-(238 = a + (50-1)d)$ → a and d are the same so subtract equations

$301 = 43d$

$\frac{301}{43} = \frac{43d}{43}$

$7 = d$ → go back to an equation:

$539 = a + (92)(7)$

$539 = a + 644$

$-105 = a$

$\therefore t_n = -105 + (n-1)(7)$

$t_n = -105 + 7n - 7$

$t_n = 7n - 112$