

Advanced Algebra

Unit 1: Sequence and Series

Assignment #6

1) Find the number of terms in each of these arithmetic sequences. One strategy is to use the formula $U_n = U_1 + (n-1)d$

a) 5, 6, 7, ..., 15

$$15 = 5 + (n-1)$$

$$10 = n-1$$

$$n = 11$$

b) 10, 20, 30, ..., 210

$$210 = 10 + (n-1)10$$

$$200 = (n-1)10$$

$$20 = n-1$$

$$n = 21$$

c) 5, 8, 11, ..., 302

$$302 = 5 + (n-1)3$$

$$99 = n-1$$

$$n = 100$$

d) -8, -6, -4, ..., 78

$$78 = U_1 + (n-1)d$$

$$78 = -8 + (n-1)2$$

$$43 = n-1$$

$$n = 44$$

e) 97, 85, 73, ..., 13

$$13 = 97 + (n-1)(-12)$$

$$7 = n-1$$

$$n = 8$$

f) 46, 42, 38, ..., -26

$$-26 = 46 + (n-1)(-4)$$

$$18 = n-1$$

$$n = 19$$

e) 9, -11, -31, ..., -571

$$-571 = 9 + (n-1)(-20)$$

$$29 = n-1$$

$$n = 30$$

h) 2.1, 3.2, 4.3, ..., 31.8

$$31.8 = 2.1 + (n-1)(1.1)$$

$$n = 28$$

2) Find the sum of each of these arithmetic sequences. You ultimately need to use the arithmetic

sums formula which is $S_n = \frac{n(U_1 + U_n)}{2}$

a) 1, 2, 3, ..., 100

$$S_{100} = \frac{100(1+100)}{2}$$

b) 6, 8, 10, ..., 30

$$30 = 6 + (n-1)2$$

$$n = 13$$

$$S_{13} = \frac{13(6+30)}{2}$$

c) 9, 13, 17, ..., 41

$$S_9 = \frac{9(9+41)}{2}$$

$$S_9 = 225$$

b) 62, 60, 58, ..., 38

$$38 = 62 + (n-1)(-2)$$

$$n = 13$$

$$S_{13} = \frac{13(62+38)}{2}$$

$$S_{13} = 650$$

e) 8, 3, -2, ..., -42

$$-42 = 8 + (n-1)(-5)$$

$$10 = n-1$$

$$n = 11$$

$$S_{11} = \frac{11(8-42)}{2}$$

$$S_{11} = -187$$

f) 1.3, 1.6, 1.9, ..., 4.6

$$4.6 = 1.3 + (n-1)(0.3)$$

$$11 = n-1$$

$$n = 12$$

$$S_{12} = \frac{12(1.3+4.6)}{2}$$

$$S_{12} = 35.4$$

g) $3\frac{1}{3}, 4, 4\frac{2}{3}, \dots, 12\frac{2}{3}$

h) $9\frac{1}{5}, 8\frac{4}{5}, 8\frac{2}{5}, \dots, 3\frac{3}{5}$

$$5050$$

$$234$$

$$41 = 9 + (n-1)4$$

$$8 = n-1$$

$$n = 9$$

Assignment #6

- 3) In the arithmetic sequence, the 1st term is 13 and the 15th term is 111. Find the common difference and the sum of the first 20 terms.

$$U_{20} = 13 + 19(7)$$

$$U_{20} = 146$$

$$S_{20} = \frac{(13+146)20}{2}$$

Common difference
7

Sum of first 20 terms
1590

- 4) In an arithmetic sequence, the 3rd term is 4 and the 8th term is 49. Find the 1st term, the common difference and the sum of the first ten terms.

1st term
-14

Common difference
9

Sum of first 10 terms:
265

$$\frac{49-4}{8-3}$$

$$\frac{45}{5} = 9$$

$$U_{10} = -14 + 9(9)$$

$$U_{10} = 67$$

$$S_{10} = 10 \frac{(-14+67)}{2} = 265$$

Assignment #6 continued

- 5) The 5th term of an arithmetic sequence is 7 and the common difference is 4. Find the 1st term and the sum of the first ten positive terms.

1st term
-9

Sum of first 10 terms
90

$$U_{10} = -9 + 9(4)$$
$$U_{10} = 27$$

$$S_{10} = \frac{10(-9 + 27)}{2}$$

- 6) The sum of the first ten terms of an arithmetic sequence is 95, and the sum of the first 20 terms of the same arithmetic sequence is 290. Calculate the first term and the common difference.

First term

Common difference