 **Methods 11 Test 6 2018**

**Recursive Sequences and Series**

**Total Marks: 60 Time Allowed: 60 minutes**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SECTION A – Resource Free**

**25 minutes – 23 marks**

**ALL** working must be shown for full marks.

**1.** **[3 marks]**

The common ratio of a geometric series is 4 and the sum of the first 5 terms is 3069. Find the first term.

**2. [3, 3 = 6 marks]**

Find i) the common ratio ii) the limiting sum:

a) 2 + 1 + ½ + ¼ + …. b) 6 + 2 +

**3.** **[2, 1, 3, 1, 3, 4 = 14 marks]**

Consider sequence A defined as Sequence A: 2, 4.5, 7, …

a) Is Sequence A an arithmetic or geometric sequence? Justify your response.

b) Define Sequence A using a non-recursive rule which will give the nth term of this sequence.

c) Using the rule found in b), or otherwise, determine whether 50 is a term of Sequence A.

**To earn marks you must show working.**

d) Determine Sequence A using a recursive rule.

Sequence B is represented by

e) Is Sequence B an arithmetic or geometric sequence? Justify your response.

f) Using algebraic techniques show how to determine the value(s) of n for which

Sequence A = Sequence B. **You must show working to earn marks.**

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**SECTION B – Calculators Allowed**  **35 minutes – 37 marks**

**4.** **[6, 2, 2 = 10 marks]**

The sum of the first two terms of a geometric sequence is 90 and the sum of the first three terms of the same sequence is 105.

a) Find the geometric sequence(s) which satisfy the above conditions.

YOU MUST SHOW WORKING.

b) Find to .

c) Find to inclusively.

**5.** **[3, 3 = 6 marks]**

For what values of k are the following sequences a) arithmetic b) geometric

i) 6, k, 54 ii) a, k, 2a iii)

AP a) a) a)

GP b) b) b)

**6.** **[3, 2, 4, 1 = 10 marks]**

The average annual earnings for workers in the hospitality industry in 1999 was $28000. If the average annual earnings of hospitality workers is expected to rise by 6.5% each year until the year 2009, find:

a) the average annual earnings for hospitality workers in 2005 to the nearest hundred dollars..

b) the total amount earned by a hospitality employee on the average wage between 1st January 2000 and 31st December 2005.

c) when the average annual wage will first exceed $70000.

d) Have any assumptions been made in determining the answers to this question?

**7.** **[2, 2, 2, 2, 2, 1 = 11 marks]**

The sum of the first n terms of a sequence is given by

a) Find the first five terms of the sequence.

b) Classify this sequence as either arithmetic or geometric. Justify your choice?

c) Find the general term rule for this sequence in the form an + b.

d) Find the recursive rule for this sequence.

e) Find the smallest value of n such that

f) Find the largest value of n such that