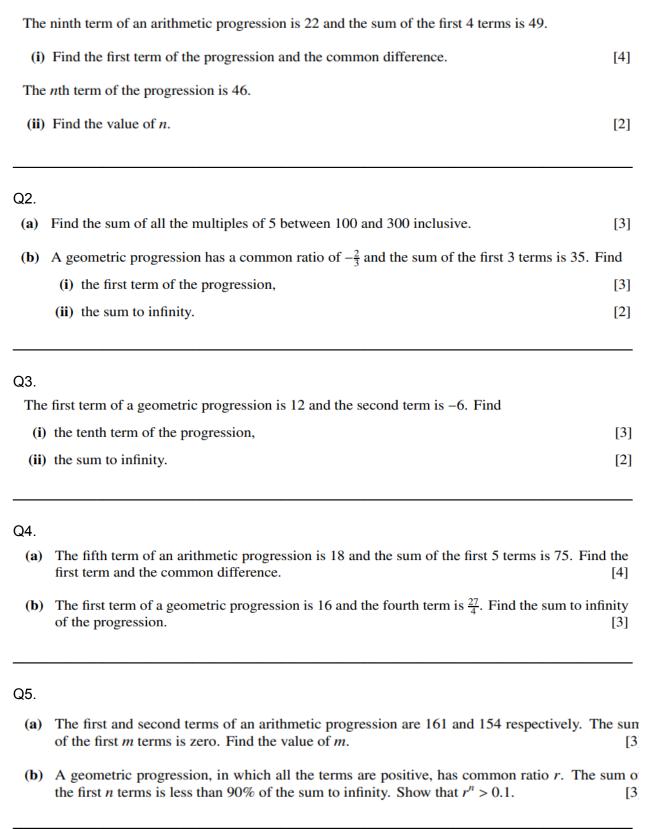
Series 2



Q1.



Series 2



[2]

Q6.

(a) A geometric progression has first term 100 and sum to infinity 2000. Find the second term. [3] (b) An arithmetic progression has third term 90 and fifth term 80. (i) Find the first term and the common difference. [2] (ii) Find the value of m given that the sum of the first m terms is equal to the sum of the first (m+1) terms. (iii) Find the value of n given that the sum of the first n terms is zero. [2] Q7. A television quiz show takes place every day. On day 1 the prize money is \$1000. If this is not won the prize money is increased for day 2. The prize money is increased in a similar way every day until it is won. The television company considered the following two different models for increasing the prize money. Model 1: Increase the prize money by \$1000 each day. Model 2: Increase the prize money by 10% each day. On each day that the prize money is not won the television company makes a donation to charity. The amount donated is 5% of the value of the prize on that day. After 40 days the prize money has still not been won. Calculate the total amount donated to charity (i) if Model 1 is used, [4] (ii) if Model 2 is used. [3] Q8. (a) An arithmetic progression contains 25 terms and the first term is -15. The sum of all the terms in the progression is 525. Calculate (i) the common difference of the progression, [2] (ii) the last term in the progression, [2] (iii) the sum of all the positive terms in the progression. [2] (b) A college agrees a sponsorship deal in which grants will be received each year for sports equipment. This grant will be \$4000 in 2012 and will increase by 5% each year. Calculate (i) the value of the grant in 2022, [2]

(ii) the total amount the college will receive in the years 2012 to 2022 inclusive.

Series 2



Q9.

- (a) The first two terms of an arithmetic progression are 1 and $\cos^2 x$ respectively. Show that the sum of the first ten terms can be expressed in the form $a b \sin^2 x$, where a and b are constants to be found.
- **(b)** The first two terms of a geometric progression are 1 and $\frac{1}{3} \tan^2 \theta$ respectively, where $0 < \theta < \frac{1}{2}\pi$.
 - (i) Find the set of values of θ for which the progression is convergent. [2]
 - (ii) Find the exact value of the sum to infinity when $\theta = \frac{1}{6}\pi$. [2]

Q10.

(a) In an arithmetic progression, the sum of the first n terms, denoted by S_n , is given by

$$S_n = n^2 + 8n.$$

Find the first term and the common difference.

(b) In a geometric progression, the second term is 9 less than the first term. The sum of the second and third terms is 30. Given that all the terms of the progression are positive, find the first term.

[5]

[3]

Q11.

The first term of an arithmetic progression is 12 and the sum of the first 9 terms is 135.

(i) Find the common difference of the progression.

[2]

The first term, the ninth term and the *n*th term of this arithmetic progression are the first term, the second term and the third term respectively of a geometric progression.

(ii) Find the common ratio of the geometric progression and the value of n.

[5]

[2]

Q12.

- (a) In a geometric progression, all the terms are positive, the second term is 24 and the fourth term is $13\frac{1}{2}$. Find
 - (i) the first term, [3]
 - (ii) the sum to infinity of the progression.
- (b) A circle is divided into n sectors in such a way that the angles of the sectors are in arithmetic progression. The smallest two angles are 3° and 5° . Find the value of n. [4]