

I. Open Response: All work must be shown for each of the following in the space provided.

1. Determine the fourth term in the sequences defined below:

[5]

(a) $t_n = 3n^2 - (5n - 2)$

(b) $t_1 = -5, t_n = 3n - 2(n + t_{n-1})$

2. Evaluate each of the following sigma notations:

[6]

(a) $\sum_{k=1}^4 2k(3k - 2)$

(b) $\sum_{k=4}^6 3(-2)^{k-1}$

3. Determine the **exact** sum of each of the following finite series:

[10]

(a) $-16 - 8 + 0 + 8 + \dots + 2040$

(b) $-10 + 20 - 40 + 80 \dots - 655360$

4. (a) If $3x + 2$, $2x - 2$ and $x - 1$ represent three consecutive terms of a **geometric sequence**, determine the common ratio of this sequence. [5]

(b) If $-3x + 3$, $4 - x$ and $2x + 8$ represent the first three terms in an **arithmetic sequence**, determine the **sum** of the first fifty terms of this sequence. [6]

5. Determine whether each of the following series will converge or diverge. If the series is convergent, determine the sum of the series. [6]

(i) $12 + 8 + \frac{16}{3} + \frac{32}{9} + \dots$

(ii) $-40 + 32 - 25.6 + 20.48 - \dots$

6. Section 139 of LP Field, home of the Tennessee Titans, is trapezoidal in shape. The first row of the section has 5 seats and each successive row has three more seats. If the top row of section 139 has 77 seats and seats in this section are priced at \$225 per seat, what is the total revenue generated by this section of the stadium if all of the seats are sold? [5]

7. The seventh and twelfth terms of a **geometric sequence** are -1458 and -354294, respectively. Determine the sum of the first 14 terms in this sequence. [6]

8. For an **arithmetic sequence**, $t_5 + t_8 = 31$ and $t_{10} + t_{15} = 91$. Find the **sum** of the first 40 terms of this sequence. [6]