Math 106, Spring 2026

Homework #9

Goal: More Warm-Up Algebra for future Area Computations

Recall the Series Summation Rules

$$\sum_{i=1}^{n} 1 = \underbrace{1 + 1 + 1 + \ldots + 1}_{n \text{ copies}} = n \qquad \sum_{i=1}^{n} \text{constant} = \text{constant} \sum_{i=1}^{n} 1 = \text{constant} \cdot n$$

$$\sum_{i=1}^{n} (a_i \pm b_i) = \sum_{i=1}^{n} a_i \pm \sum_{i=1}^{n} b_i \qquad \sum_{i=1}^{n} \text{constant} \cdot a_i = \text{constant} \sum_{i=1}^{n} a_i$$

For problems 1-6, Simplify each Series sum in terms of i and/or n. Recall that you can pull n and constants out of the Series Sums but not i, because i is the counter index for the Series.

1. Show that $\displaystyle\sum_{i=1}^{n} 7 = \boxed{7n}$

2. Show that $\displaystyle\sum_{i=1}^{n} (-5) = \boxed{-5n}$

3. Show that $\displaystyle\sum_{i=1}^{n} \left(\frac{5i}{n} - 7 \right) \cdot \left(\frac{3}{n} \right) = \boxed{\left(\frac{15}{n^2} \sum_{i=1}^{n} i \right) - 21}$

4. Show that $\displaystyle\sum_{i=1}^{n} \left(2 + \frac{5i}{n} \right)^2 \cdot \left(\frac{4}{n} \right) = \boxed{\left(\frac{100}{n^3} \sum_{i=1}^{n} i^2 \right) + \left(\frac{80}{n^2} \sum_{i=1}^{n} i \right) + 16}$

5. Show that

$$\sum_{i=1}^{n} \left[\left(-1 + \frac{4i}{n} \right)^2 - 3 \left(-1 + \frac{4i}{n} \right) - 8 \right] \cdot \left(\frac{4}{n} \right) = \boxed{\left(\frac{64}{n^3} \sum_{i=1}^{n} i^2 \right) - \left(\frac{80}{n^2} \sum_{i=1}^{n} i \right) - 16}$$

6. Show that

$$\sum_{i=1}^{n} \left[\left(-2 + \frac{3i}{n} \right)^2 - 5 \left(-2 + \frac{3i}{n} \right) + 6 \right] \cdot \left(\frac{3}{n} \right) = \boxed{\left(\frac{27}{n^3} \sum_{i=1}^{n} i^2 \right) - \left(\frac{81}{n^2} \sum_{i=1}^{n} i \right) + 60}$$

REGULAR OFFICE HOURS

Monday: 12:00–3:00 pm

7:30–9:00 pm TA Uchenna, SMUDD 208A

Tuesday: 1:00–4:00 pm

Wednesday: 1:00-3:15 pm

Thursday: none for Professor

4:00–5:30 pm TA Uchenna, SMUDD 208A

Friday: 12:00–2:00 pm

- Email with any questions dbenedetto@amherst.edu
- Please present a Final Draft only.