

## Homework #9

Due **Friday, February 28th** in Gradescope by 11:59 pm ET**Goal:** More Warm-Up Algebra for future Area Computations

Recall the Series Summation Rules

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

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

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  $\sum_{i=1}^n 7 = \boxed{7n}$

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

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

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

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 Andrew, SMUDD **207**

**Tuesday: 1:00–4:00 pm**

**Wednesday: 1:00–3:00 pm**

**Thursday: none for Professor**

8:00–9:30 pm TA Andrew, SMUDD **208A**

**Friday: 12:00–2:00 pm**

- Email with any questions [dbenedetto@amherst.edu](mailto:dbenedetto@amherst.edu)
  - Please present a Final Draft only.