DO NOT WRITE ON THIS SHEET! DO ALL PROBLEMS ON A SEPARATE SHEET/IN YOUR NOTEBOOK. WORK WITH YOUR GROUP AND TRY TO HELP EACH OTHER TODAY!

Objective 1 (from yesterday): You should be able to tell whether a geometric series converges or diverges and what value it converges to.

If $|r| \geq 1$, the geometric series diverges.

If $|r| < 1$, the geometric series converges to the sum $S = \frac{a}{1-r}$, where a is the first term.

☐ **Checkpoint: Solve the following problems and check your answers with me.**

Tell whether the geometric series converges or diverges. If it converges, what value does it converge to?

1. $\sum_{n=0}^{\infty} \left(\frac{4}{3}\right)^n$

2. $\sum_{n=0}^{\infty} 2\left(\frac{-2}{3}\right)^n$

3. $\sum_{n=0}^{\infty} \frac{3}{2^{n-1}}$

4. $\sum_{n=0}^{\infty} \frac{4}{2^n}$

5. $\sum_{n=0}^{\infty} \frac{2^n}{100}$

6. $\sum_{n=0}^{\infty} \frac{5^{n+2}}{4^{n-1}}$

❖ Unsure about what to do? Go to Weebly and check out Assignments and Videos → BC Calculus → Unit 2 Sequences and Series → Watch video Day 1 Geometric Series and take good notes.

Objective 2 (from yesterday): You should be able to use partial fractions to find the sum of a telescopic (telescoping) series.

Step 1: Rewrite series using partial fractions.

Step 2: Write out the first several terms of the series. Don't simplify.

Step 3: Zero out any terms and see what's left!

*Note: You will be assessed on this series but it is not covered on the AP exam.

☐ **Checkpoint: Solve the following problem and check your answer with me.**

Find the value to which the telescopic series converges.

1. $\sum_{n=0}^{\infty} \frac{1}{n^2+3n+2}$

❖ Unsure about what to do? Go to Weebly and check out Assignments and Videos → BC Calculus → Unit 2 Sequences and Series → Watch video Day 2 Telescopic Series and take good notes.

➢ At this point, if there is anything else in the packet you did not get for Geometric Series or Telescopic Series, go to Weebly → My BC Notes → Find the packet key and copy down any missing information.

Objective 3 (today): You should be able to use the nth Term Test for Divergence to tell if a series diverges.

If $\lim\limits_{n\to\infty} a_n \neq 0$, then $\sum_{n=1}^{\infty} a_n$ diverges.

*Note: This is only a test for divergence. If the limit is $= 0$, then we are unable to determine convergence or divergence until we know another test to use.

☐ **Solve problems A, B, and C in your packet under nth Term Test AND A and B on the 9.3 page (review of geometric and nth term test) and check answers on Weebly → My BC Notes → Find the packet key.**

❖ Unsure about what to do? Go to Weebly and check out Assignments and Videos → BC Calculus → Unit 2 Sequences and Series → Watch video Day 2 nth Term Test and take good notes.

Objective 4 (today): You should be able to use the Integral Test to determine if a series converges or diverges.

1. To use this test, f must be CONTINUOUS, POSITIVE, and DECREASING on the interval $[1, \infty)$. You need to state these 3 conditions before using the Integral Test. You can always find the first few terms of the series to see these conditions are met.
2. Think of a_n as $f(n)$ or $f(x)$.

   - If $\int_1^{\infty} f(x)dx$ is convergent (solve the improper integral), then $\sum_{n=1}^{\infty} a_n$ is convergent (BUT NOT NECESSARILY TO THE SAME VALUE!).
   - If $\int_1^{\infty} f(x)dx$ is divergent (solve the improper integral), then $\sum_{n=1}^{\infty} a_n$ is divergent.

☐ **To fill in the page labeled "Exploring the Integral of a Series," watch and take notes from Weebly → My BC Notes → Link says Proof of Integral Test. (Note: If you don't quite grasp this entire proof, we will review this later.)**

☐ **After watching the video and taking notes, add this to your packet on that same page:**

$$\sum_{n=2}^{\infty} a_n \; < \; \int_1^{\infty} f(x)dx \; < \; \sum_{n=1}^{\infty} a_n$$

Or in other words, the Right Riemann Sum (starts at n = 2) will be the underestimate of the integral and

the Left Riemann Sum (starts at n = 1) will be the overestimate of the integral.

☐ **Solve problems A and B in your packet under Integral Test and check answers on Weebly → My BC Notes → Find the packet key.**

❖ Unsure about what to do? Go to Weebly and check out Assignments and Videos → BC Calculus → Unit 2 Sequences and Series → Watch video Day 2 Integral Test and take good notes.

☐ **LAST TO-DO for today: In your packet, there is a box called "Comparing Two Series." You do not need to fill this out. I like the Khan Academy explanation better. Watch the video on Weebly → My BC Notes → Proof that the Harmonic Series Diverges (Note: You don't need to KNOW this, but it's sort of cool ☺)**

☐ **For homework, work on Days 2 and 3 on the schedule on Weebly. I'll check these tomorrow but I'm flexible if you need more time.**