

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Give a precise definition of an **increasing sequence** and of a **bounded above sequence**.

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- (b) State precisely the **Monotonic Sequence Theorem**.

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- (c) Give an *example of a sequence* for which the Monotonic Sequence Theorem applies and explain how the theorem applies.

2. (a) Give a precise definition of the n -**th partial sum** of an (infinite) series. Give a precise definition of **convergence** for a series.
- (b) Give a precise definition of a **geometric series**. Give an *example of a convergent geometric series* and find its sum.
- (c) State precisely the **Test for Divergence** and give an *example of a series* to which it applies. Explain how the test applies for your example series.

3. (a) Give a precise definition of **the p -series**. Give an *example of a convergent p -series* and an *example of a divergent p -series*.

- (b) State precisely **the Comparison Test**. Give an *example of a series* whose convergence or divergence can be determined by applying the test and explain how this can be done.

4. (a) State precisely **the Alternating Series Test**. Give an *example of an alternating series* for which the test applies.
- (b) Give the precise definition of an **absolutely convergent series** and an *example of a series* that is absolutely convergent.
- (c) State precisely **the Ratio Test**. Give an *example of a series* for which the test can be applied and explain how this is done.

5. (a) Give a precise definition of a **power series centered at a** . Then, pick an a and give an *example of a power series* centered at the specific a that you picked.

- (b) Find the radius of convergence of the power series $\sum_{n=0}^{\infty} \frac{x^n}{n!}$.