

Math 1552
Summer 2022
Test 2
June 30, 2022
Time Limit: 50 Minutes

Name (Print): _____

Canvas email: _____

Teaching Assistant/Section: _____

GT ID:

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By signing here, you agree to abide by the **Georgia Tech Honor Code**: *I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Georgia Tech Community.*

Sign Your Name: _____

1. (5 points) Consider the sequence

$$\left\{ \frac{3n}{2n+5} \right\}$$

- (a) Does this sequence converge or diverge? If it converges, what is the limit?

- (b) Based on part (a), can you make any conclusion about the convergence of the series $\sum_{k=1}^{\infty} \frac{3n}{2n+5}$?

2. (5 points) Give an example of a sequence that is monotone, but diverges. Show that it diverges.

3. (5 points) Find the sum of the series

$$\sum_{k=2}^{\infty} \left(\frac{1}{9}\right)^k$$

4. (5 points) Find the sum of the series

$$\sum_{n=1}^{\infty} \left(\frac{1}{n} - \frac{1}{n+2}\right)$$

5. (10 points) Use the method of trigonometric substitution to calculate the integral:

A correct answer without work will not receive full credit.

$$\int \frac{3 dx}{(9x^2 + 1)^2}$$

6. (10 points) Use the method of partial fractions to calculate the integral:

A correct answer without work will not receive full credit.

$$\int \frac{x+1}{x(x^2+1)} dx$$

7. (10 points) Determine whether the given series converges or diverges using the **Integral test**. Make sure that you (1) name the test and state the conditions needed for the test you are using, (2) show work for the test that requires some math, and (3) state a conclusion that explains why the test shows convergence or divergence.

$$\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$$