

Math 132 - Final Exam B

May 12, 2021

Name _____

Score _____

Show all work to receive full credit. Each problem is worth 5 points. Place your final answer in the box provided.

1. Find the area of the bounded region between the graphs of $y = 2x^2 + 1$ and $y = x^2 + 2x + 1$.

2. The region bounded by the graphs of $x + y = 1$, $x = 0$, and $y = 0$ is rotated about the x -axis. Find the volume of the solid that is generated.

3. Write $y = \operatorname{sech} x$ in terms of exponential functions. Then use your result to find the slope of the line tangent to the graph of $y = \operatorname{sech} x$ at the point where $x = 1$. Round your final answer to four decimal places.

4. Evaluate the definite integral: $\int_1^2 x^3 \ln x \, dx$
Write your final answer in exact form.

5. Evaluate the indefinite integral: $\int \sin^3 2x \cos^5 2x dx$

6. Use a partial fraction decomposition to evaluate $\int \frac{x-1}{x^2+x} dx$.

7. Suppose the series $\sum_{n=1}^{\infty} a_n$ converges with sum $S = 3$.

(a) If S_n denotes the n th partial sum of the series, find $\lim_{n \rightarrow \infty} S_n$.

(b) Find $\lim_{n \rightarrow \infty} a_n$.

8. Determine whether the series converges or diverges. If it converges, find the sum.

$$\sum_{n=1}^{\infty} \frac{7}{2^n}$$

9. Use logarithm laws to rewrite as a telescoping series. Then determine whether the series converges or diverges.

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

10. Use a test to determine whether the series converges or diverges.

$$\sum_{k=1}^{\infty} \frac{3k^2 + 7k}{5^k k^2}$$

11. Determine whether the series converges conditionally, absolutely, or not at all. Show work or explain your reasoning.

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\sqrt[3]{n}}$$

12. The series $\sum_{n=0}^{\infty} \frac{(-1)^n}{n!}$ converges to $1/e$. Use the first six terms of the series (through $n = 5$) to approximate $1/e$ and find an upper bound on the error made in the approximation.