**Study Guide for Final Examination**

MATH 1502

1. Compute derivatives of the following functions.

 (a) (b)

 (c) (d)

 (e) (f)

2. Evaluate the integral below by each of the specified methods.

 (a) Use the trigonometric substitution .

 (b) Use integration by parts with .

3. Evaluate each of the indefinite integrals.

 (a) (b)

 (c) (d)

 (e) (f)

 (g)

4. Evaluate . (Use the trigonometric identity .)

5. Use the Trapezoidal Rule with to approximate

6. The table below gives some values of a function *L*.

|  |  |
| --- | --- |
|  |  |
| 20 | 1.0 |
| 25 | 1.2 |
| 30 | 1.0 |
| 35 | 0.9 |
| 40 | 1.0 |
| 45 | 1.1 |
| 50 | 1.3 |
| 55 | 1.4 |
| 60 | 1.3 |

 Approximate using the Trapezoidal Rule and Simpson’s Rule.

For problems 7 and 8 do each of the following:

 (a) State why the integral is improper.

 (b) Express the integral as a limit or limits.

 (c) Evaluate the integral and state whether it diverges or converges.

7.

8.

9. Evaluate the following limits.

 (a) (b)

 (c) (d)

 (e) (f)

10. Find the arc length of the graph of the function over the indicated interval.

 (a) (b)

11. (a) Find the area of the surface formed by revolving the graph of on the interval [0, 1] about the -axis.

 (b) Find the area of the surface formed by revolving the graph of on the interval [1, 8] about the -axis.

12. Find the sum of the geometric series:

13. Approximate the sum of each of these series with error less than 0.0001:

 (a) (b)

14. What information does the th-Term Test give about each of these series?

 (a) (b)

15. Determine the convergence or divergence of the series using the Limit Comparison Test:

 Identify the series used in the comparison.

16. Determine the convergence or divergence of the series using the Integral Test:

17. Determine whether the series below is absolutely convergent, conditionally convergent, or divergent.

18. What information does the Ratio Test give about this series?

19. Find the degree 5 Maclaurin polynomial for . Use it to approximate the value of .

20. Determine the interval of convergence of the power series:

21. Use the Basic List of Maclaurin Series to determine a power series for

 (a) (b)

22. Convert the following polar equations into rectangular equations.

 (a) (b)

 (c)

23. Convert the following rectangular equations into polar equations.

 (a) (b)

 (c) The circle centered at with radius 4.

24. Given the cardioid . Find

 (a) the area inside it (b) its arc length

25. Find the area of one leaf of .

**Answers**

1. (a) (b)

 (c) (d)

 (e) (f)

2. (a) (b)

 NOTE: These answers are equal. Both simplify to

3. (a) (b)

 (c) (d)

 (e) (f)

 (g)

4. 5. 149.71

6. Trapezoidal: 45.25; Simpson’s: 45.5 7. 9

8.

9. (a) 4 (b) ∞

 (c) 0 (d)

 (e) 0 (f) 0

10. (a) (b)

11. (a) (b)

12. 10

13. (a) 1.08223390683 (); error < 0.000099 (b) 0.585648719085 (); error < 0.000094

14. (a) no information (b) diverges

15. diverges; 16. converges

17. diverges 18. converges

19.

20. [1, 5]

21. (a) (b)

22. (a) (b)

 (c)

23. (a) (b)

 (c)

24. (a) (b) 8

25.