Math 2232 Quiz (Math 2231 Final exam)

Show all work for potential partial credit on this sheet. This will be turned in with your final exam in class portion. Except where indicated otherwise exact answers are expected.

1. Approximate integration
2. Can you calculate  directly and exactly using techniques in this class? If so, do so. If not explain why.
3. Use the trapezoidal rule with to approximate this integral.
4. Use Simpson’s rule with to approximate this integral.
5. Use the error estimate for the trapezoidal rule to determine the lowest value of which will ensure the estimate you develop has an error of less than .0000001.
6. You are standing at the edge of a slow-moving river which is one mile wide and wish to return to your campground on the opposite side of the river. You can swim at 2 miles per hour and walk at 3 miles per hour. You must first swim across the river to any point on the opposite bank. From there walk to the campground, which is one mile from the point directly across the river from where you start your swim. What route will take the least amount of time?
7. Points A and B are consecutive vertices of rectangle, both located on the positive x axis with the x coordinate of A less than the x coordinate of B. Point C lies on the line in the first quadrant and D lies on the line  also in the first quadrant such that ABCD forms a rectangle. What is the maximum area of such a rectangle? What are the coordinates of A, B, C, D that gives this area?
8. The velocity of a particle moving along the x-axis at any time  is given by the equation



1. How many times, if any, does the particle change directions from time  to ?
2. What is the speed when ?
3. What is the acceleration when?
4. If the particle is positioned e units to the right of the origin when , what function , correctly models the position of the particle when 
5. How far does the particle move from time  to ?
6. Consider . Use Newton’s method with  to approximate a zero for the polynomial to within one one-thousandths of the actual value. Complete the values in the following table – the first two entries are done for you.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| 1 | 2 |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

1. A fish is reeled in at a rate of 1 foot per second from a point 10 feet above the water.  At what rate is the angle between the line and the water changing when there is a total of 25 feet of line out?
2. The time required for one complete oscillation of a pendulum is called its period. If the length of the pendulum is measured in feet and the period is measured in seconds, then the following equation holds



with representing a constant called the acceleration due to gravity? If the percent error in the measurement of  is , what is the estimate of the percent error of the period?

1. Provide a complete statement of the mean value theorem for derivatives.
2. Provide a complete statement of the first fundamental theorem of calculus
3. Provide a complete statement of the second fundamental theorem of calculus
4. Provide a complete statement of the first derivative test.
5. Provide a complete statement of the second derivative test.
6. Provide a complete statement of the squeeze theorem
7. Provide a complete statement of the intermediate value theorem for continuous functions
8. What can be said about  if 
9. What can be said about  if 
10. Derivatives
11. What is the definition of the derivative for a function 
12. Use the definition of the derivative to calculate  for 
13. Integrals
14. What is the definition of the definite integral as the limit of a sequence of Riemann sums
15. Use this definition to compute 
16. Use Logarithmic differentiation to find  for 
17. Find for 
18. Find for 
19. Find for 
20. Find for 
21. Find for
22. Consider the function 
23. What are the critical numbers for this function?
24. Use the first derivative test on the smallest of the critical numbers to determine if it is a relative maximum or a relative minimum. Explain your work.
25. Use the second derivative test on the largest of the critical numbers to determine if it is a relative maximum or minimum. Explain your work.
26. Find the value c guaranteed to exist for by the mean value theorem on the interval 
27. What are the coordinates of the absolute maximum and minimum for this function on the interval
28. Consider the curve in the plane given by . Find the equation of the tangent line(s) to this curve when 
29. What is the average value of the function?
30. If 
31. Find 
32. On what interval(s) is concave down? Put your answer in interval notation and explain it using complete sentences.
33. ***Limits: Evaluate the following limits or explain why they do not exist***
34. 
35. 
36. 
37. 
38. 
39. 
40. 
41. 
42. ***Evaluate the following definite integrals.***









