

# Mathematics 3010, Summer 2009: Chapter 16-17

## History

1. Who discovered the interchangeability result for differentiation and integration?
2. How did Johann Bernoulli solve the brachistochrone problem (roughly)?
3. What shape did Galileo assume a hanging cable assumed?
4. What shape did Galileo pose as a solution to the brachistochrone problem?
5. How is the conflict between Euler's solutions of differential equations using trigonometric functions and D. Bernoulli's use of complex exponentials resolved?
6. List some problems considered by Simpson in his calculus text.
7. Who first used the "prime" notation for derivatives?
8. What is Simpson most famous for today?

## Other (for everyone)

1. Use the Euler-Lagrange equations to solve the brachistochrone problem. You may use the textbook as a guide, but put the solution in your own words.
2. Use Euler's method to determine  $dx dy$  in terms of polar coordinates.