**Presentations07**

**The Beginning of Infinitesimal Calculus**

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|  | **Topic/Exercise** | **Presenter** |  |
| 1 | Find the Maclaurin expansion for , and . Then substitute  *x ← ix* to obtain the identity ; then repeat with  *x ← -ix* to get another identity; finally solve two equations in two unknowns to get and in terms of and (See my notes on the class website: <http://webhome.auburn.edu/~smith01/math3010Sp25/EulerFormulas.pdf> ) |  |  |
| 2 | Consider the equation . Set up two equations in and and find real numbers that satisfy the equations. This will calculate . |  |  |
| 3 | Prove de Moivre’s theorem:  Where . Hint: use induction. |  |  |
| 4 | Look up the hyperbolic trig functions, sinh and cosh; prove the identity: |  |  |
| 5 | Prove that the sum of all the elements in a row of Pascal’s triangle is an integral power of 2. Hint: try induction. (See my notes on the class website: <http://webhome.auburn.edu/~smith01/math3010Sp25/PascalTriangleIdentities.pdf> .) |  |  |
| 6 | Use the fact that  to obtain the identity |  |  |
| 7 | In your textbook select some problems to do from the section on the history of the development of the infinitesimal calculus. |  |  |
| 8 | Use the method of exhaustion to calculate the area of a parabolic sector.  (See my notes on the class website:  <http://webhome.auburn.edu/~smith01/math3010Sp25/MethodOfExhaustion.pdf> .) |  |  |
| 9 | Select one of the “notes” from the notes region of the class website to present on the early calculus or related to the current class discussions. |  |  |