

## Final Exam Review

1. Review “Log of Class Activities” from Wednesday, February 27, through Friday, April 26.
2. Review Homework #7 and #8 and the solutions.
3. Review Exam #3.
4. Be able to do all of the problems that we did in class, for homework, and for Exam #3. The explanations are just as important as the final answers. You should be able also to solve variations of these problems. See “Piano Tuning,” “Guitar Frets,” “Model T,” “Interesting Problems,” “Savings,” “Loans,” “Credit Cards,” “Partial Sums of Geometric Series,” “General Periodic Savings Formula,” “General Loan Formula,” “Finite Figure Symmetries,” “Border Pattern Symmetries,” “Wallpaper Pattern Symmetries,” “Symmetries,” “Complex Numbers and Transformations,” “Composing Transformations,” “Position and Velocity,” “Rates of Change,” and “Good Questions.”
5. You do not need to memorize the Eight Mathematical Practices. but you should be able to identify problems we have encountered whose solutions exemplify these practices. These are listed on pages 6–8 of [http://www.corestandards.org/assets/CCSSI\\_Math%20Standards.pdf](http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf).
6. Be able to use geometric sequences to solve such problems as “Piano Tuning” (which we did) and “Guitar Frets” (which we did not do).
7. Be able to derive and explain formulas for simple and compound interest, and solve problems involving simple and compound interest.
8. Be able to derive the formula for the sum of the first  $k$  terms in a geometric sequence.
9. Be able to use properties of compound interest to derive procedures for and to solve problems involving past and future value of money, saving money with period deposits of money, and loans with periodic repayments.
10. Be able to identify and describe various symmetries present in finite figures, border patterns, and wallpaper patterns.
11. Be able to classify the official symmetry type of finite figures, border patterns (using a provided flowchart), and wallpaper patterns (using a provided flowchart).
12. Be able to draw finite figures and border patterns with specified symmetry type.

13. Be able to explain the net effect of composing various rigid motions.
14. Be able to explain the process we used to prove that there were only seven different types of border patterns.
15. Be able to describe various rigid motions using functions of a complex variable.
16. Be able to use functions of a complex variable to determine the net effect (both in terms of the final formula and in terms of the type of transformation) of composing various rigid motions.
17. Be able to explain the relationship between graphs of position and graphs of velocity, and why it makes sense to involve areas under curves and slopes of tangent lines.
18. Be able to motivate the definition of the derivative  $f'(a)$ , which is #1 in “Rates of Change.”
19. Be able to motivate the Fundamental Theorem of Calculus statement, which is #2 in “Rates of Change.”
20. Be able to explain the solutions of the particular “Good Questions” (and related problems) that we discussed in class. So far we looked at problems 1–5 in the first section “Limits.”