

DIFFERENCE EQUATIONS AND GRAPHS OUTLINE

MA 131-006

The main question: What happens to a bank account over a long period of time?
How can we use that information to make good decisions?

- Graphing difference equations
 - Vertical direction
 - long term behavior
 - Key vocabulary:
 - * *Monotonic*
 - * *Unbounded*
 - * *oscillating*
 - * *constant*
 - Main theorem: The graph for a difference equation is either: monotonic, oscillating, or constant.
 - * Is this really dumb? Is it true for *every function*?
 - What happens when $a > 0$ or $a < 0$ (we'll assume $a \neq 0$)?
 - What happens when $|a| < 1$? What happens when $|a| > 1$?
 - Examples 1-5 from 10.3
- Two types of big picture questions:
 - Graphical solution: Answer a question by analyzing a graph
 - Examples:
 - * Given an initial deposit in a saving account, an interest rate, how much large can we withdrawal from the account, and never run out of money?
 - * Given the interest rate and loan amount, how small can we make our monthly payment, and still payoff the loan, eventually?
 - Algebraic: Answer a question by solving an algebraic equation
 - Examples:
 - * Given an interest rate, monthly payment size, and the end of the loan, how much can you afford to borrow?
 - * Example: Given an interest rate, amount being borrowed, and the end of the loan, how large is your (monthly) payment?

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