

Math 1050-2 ~ Exam #2 Review Guide*

*This is only a guide, for your benefit, and it in no way replaces class notes, homework, or studying

General Tips for Studying:

1. Review this guide, class notes, the text, and examples done in class and in the text
2. Review comments on quizzes and *rework* ALL quiz problems
3. *Review* (assuming you have completed it) ALL homework assigned for Chapters 2 and 3
4. Complete ALL suggested problems for the exam review given in class
5. Start studying early enough to ask questions!

Helpful Definitions:

Rework: write down the problem and solve it yourself, then check your work

Review: look over the material making note of what you comprehend, rework what you do not

Chapter 2: Polynomial and Rational Functions

♦ 2.1 Quadratic Functions and Models:

- Be able to sketch parabolas, $f(x) = ax^2 + bx + c$, using the following information:
 - The parabola opens up if $a > 0$ (so the vertex is a minimum) and down if $a < 0$ (so the vertex is a maximum).
 - The vertex of a parabola is $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$
 - Find the y-intercept of the parabola. Write as an **ordered pair**. Let $x=0$ and solve for y . Notice this always gives you $y=c$, so the y-intercept is $(0, c)$.
 - Find the x-intercept(s) of the parabola. Write as an **ordered pair(s)**. Let $y=0$ and solve for x . You can either try to factor or just use the quadratic formula (I suggest the latter).
 - There is a handout with more detail and a sample question on the website.
- Understand how to use quadratic equations in applications (limit your study of this based on the homework questions I assigned here). There WILL be one application problem on the exam (from this section or section 3.5).

♦ 2.2 Polynomial Functions of Higher Degree:

- Be able to use the leading coefficient test to describe the right-hand and left-hand behavior of the graph of a polynomial function (see table page 141).
- Know how to find a polynomial with a given degree and given zeros.
- Understand how to find zeros of polynomials and their multiplicities. Then be able to determine the number of turning points a given graph has based on those multiplicities.
- Be able to sketch the graphs of higher degree polynomials using the following steps:
 - apply the leading coefficient test
 - find the zeros and their multiplicities
 - plot some extra points
 - draw a continuous curve

♦ 2.3 Polynomial and Synthetic Division:

- Be able to use long division to divide polynomials by polynomials
 - Steps: 1. Write the dividend and divisor in descending powers of the variable.

2. Insert placeholders with zero coefficients for missing powers of the variable.
3. Perform long division of the polynomials as you would with integers.
4. Continue the process until the degree of the remainder is less than that of the divisor.

- Remember to write your answer as: $q(x) + \frac{r(x)}{d(x)}$

- Use synthetic division to divide polynomials by polynomials of the form $(x-k)$
 - Remember! k can be positive OR negative
 - Know how to use synthetic division to factor polynomials using the Factor Theorem:
 - A polynomial $f(x)$ has a factor $(x-k)$ iff $f(k)=0$
- ◆ 2.4 Complex Numbers:
- Be able to write complex numbers and perform operations with these numbers
 - $i = \sqrt{-1}$ so that $i^2 = -1$
 - This means that $\sqrt{-c} = \sqrt{c(-1)} = \sqrt{c}\sqrt{-1} = i\sqrt{c}$
 - Know how to add, subtract, and multiply (use FOIL) complex numbers
 - Understand what complex conjugates are and be able to use them to write the quotient of two complex numbers in standard form $a+bi$
 - Remember! $(a+bi)(a-bi) = a^2 + b^2$ (pay special attention the the + sign here)
 - Make note that these skills allow us to find complex zeros of polynomials (we can still use the quadratic formula to solve quadratic equations).
- ◆ 2.5 Zeros of Polynomial Functions:
- Remember that the Fundamental Theorem of Algebra tells us that an n^{th} degree polynomial has exactly n roots. As a result, the polynomial can be factored into exactly n linear factors.
 - Know how to apply the rational zero test (page 170) to find all roots (real and complex) of a given polynomial, and then factor that polynomial completely.
 - You may be asked to list all possible rational zeros.
 - Remember! This involves synthetic division.
 - Be able to apply Descartes's rule of signs to determine how many positive and negative real roots a polynomial has.
- ◆ 2.6 Rational Functions:
- Know how to find the domain of rational functions
 - Be able to find the vertical, horizontal, and slant asymptotes of rational functions (see the rules on page 186).
 - Remember! If a function has a slant asymptote, it does not have a horizontal
 - Know how to analyze graphs of rational functions based on the 7 rules on page 187. This takes you step by step through how to graph a rational function.

Chapter 3: Exponential and Logarithmic Functions

- ◆ 3.1 Exponential Functions and Their Graphs:
- Know how to graph exponential functions using transformations or point plotting.
 - Be able to use the One-to-One property to solve exponential equations.

- ◆ 3.2 Logarithmic Functions and Their Graphs:
 - **Memorize** the very important rule: $y = \log_a x$ iff $x = a^y$
 - Be able to use the above rule to convert equations for logarithmic functions to exponential form and vice versa.
 - Know how to use the One-to-One property to solve logarithmic equations.
 - Be able to graph logarithmic functions using transformations or point plotting.

- ◆ 3.3 Properties of Logarithms:
 - Be able to use the change of base formula to rewrite and evaluate logarithmic expressions
 - Be especially sure you can utilize the Properties of Logarithms (page 240) to evaluate or rewrite logarithmic expression and to expand or condense logarithmic expressions.

- ◆ 3.4 Exponential and Logarithmic Equations:
 - Solve simple exponential and logarithmic equations by using the One-to-One property or the Inverse Property
 - Use the following methods for solving exponential and logarithmic equations in general:
 - Rewrite an *exponential* equation in logarithmic form and apply the inverse property of logarithmic functions. (Think of this as taking the logarithm of each side of the equation).
 - Rewrite a *logarithmic* equation in exponential form and apply the inverse property of exponential functions. (Think of this as exponentiating both sides of the equation).

- ◆ 3.5 Exponential and Logarithmic Models:
 - Recognize the 5 most common types of models (applications) that use exponential and logarithmic functions.
 - There WILL be one application question on the exam and it will come from either this section or section 2.1.
 - Focus on the applications that were assigned in the homework. Take particular note of: compound interest, radioactive isotopes, carbon dating, and bacterial growth.
 - Formulas will be given if needed

Just a Reminder...

You are responsible for knowing and applying all material covered on Exam 1 as it relates to the current material being tested. If you haven't already, I suggest you look over your Exam 1 and study or ask questions about material you may have struggled with (especially if it is used in Chapters 2 and 3).