Exam 2 Review

This review sheet highlights the topics we covered in class. This is not to be considered an exhaustive review. The best way to study is to work through the problems listed on this sheet (keep working problems until you feel comfortable with a topic - you don’t have to work all of them), and to review class notes and quizzes. Use of an appropriate graphing calculator will be allowed on the exam, but you must show all your work for full credit.

Section 2.1 - What Is a Function?
- Definition of a function.
- Evaluate a function.
  Page 152: 13-33 odd
- Determine the domain of a function given its formula.
  Page 154: 43-59 odd

Section 2.2 - Graphs of Functions
- Sketch the graph of a function by plotting points.
  Page 166: 19-39 odd
- Sketch the graph of a piecewise-defined function.
  Page 167: 59-71 odd
- Sketch the graph of a step function.
  Page 167: 75, 76
- Find the domain and range of a function from its graph. Evaluate a function using its graph.
  Page 165: 1-4; Page 166: 7-10
- Vertical line test.
  Pages 165-166: 5-10
- Determine whether an equation defines a function.
  Page 166: 41-51 odd

Section 2.5 - Transformations of Functions

Vertical and Horizontal Shifts Suppose $c > 0$. To obtain the graph of
- $y = f(x) + c$, shift the graph of $y = f(x)$ a distance of $c$ units upward
- $y = f(x) - c$, shift the graph of $y = f(x)$ a distance of $c$ units downward
- $y = f(x - c)$, shift the graph of $y = f(x)$ a distance of $c$ units to the right
- $y = f(x + c)$, shift the graph of $y = f(x)$ a distance of $c$ units to the left

Vertical and Horizontal Stretching and Reflecting Suppose $c > 1$. To obtain the graph of
- $y = -f(x)$, reflect the graph of $y = f(x)$ about the $x$-axis
- $y = f(-x)$, reflect the graph of $y = f(x)$ about the $y$-axis
- $y = cf(x)$, stretch the graph of $y = f(x)$ vertically by a factor of $c$
\( y = (1/c)f(x) \), compress the graph of \( y = f(x) \) vertically by a factor of \( c \)

\( y = f(cx) \), compress the graph of \( y = f(x) \) horizontally by a factor of \( c \)

\( y = f(x/c) \), stretch the graph of \( y = f(x) \) horizontally by a factor of \( c \)

- Combine shifting, stretching, and reflecting.

Pages 194-195: 1-11 odd, 12; Page 196: 45,46

- Determine whether a function is even, odd, or neither. Know the symmetry associated with even and odd functions.

Page 196: 51-57 odd

**Section 2.8 - Combining Functions**

- Given functions \( f \) and \( g \), find the functions \( f + g, f - g, fg, \) and \( f/g \) and their domains.

Page 225, 1-10

- Given functions \( f \) and \( g \), find the functions \( f \circ g, g \circ f, f \circ f, \) and \( g \circ g \) and their domains.

Page 226: 29-39 odd

**Section 2.9 - One-to-One Functions and Their Inverses**

- Definition of a one-to-one function.

- Horizontal line test.

Pages 236-237: 1-6

- Determine whether a function is one-to-one: either formally prove the function is one-to-one or find a pair of distinct inputs that yield the same output to show the function is not one-to-one.

Page 237: 7-15 odd

- Definition of an inverse function.

Page 237: 17-20

- Show two functions are inverses of one another.

Page 237: 21-29 odd

- Given a function \( f \), find its inverse \( f^{-1} \).

Page 237: 31-49

- Draw the graph of \( f^{-1} \) given the graph of \( f \).

Page 238: 65,66

**Section 3.1 - Polynomial Functions and Their Graphs**

- Polynomial vocabulary: degree, coefficients, constant term, leading term, leading coefficient, monomial, zeros, roots.

- Characteristics of the graph of a polynomial function: smooth and continuous.
• Determine the end behavior of a polynomial function.

Last problem on Quiz 5

• Graph a polynomial function using the steps outlined in class.

Page 269: 11-35 odd

• Determine the local extrema (local maxima and local minima) of a polynomial function using a calculator.

Page 270: 57-65 odd

Section 3.2 - Dividing Polynomials

• Terminology related to the division of polynomials: dividend, divisor, quotient, remainder.

• Divide polynomials using long division.

Page 278: 1-9 odd

• Divide polynomials using synthetic division.

Page 278: 11-23 odd

• The Factor Theorem and its applications.

Page 278: 39,40,43,45

Section 3.6 - Rational Functions

• Definition of a rational function.

• Sketch a graph of $f(x) = \frac{1}{x}$.

• Determine the $x$-intercepts and $y$-intercepts and any asymptotes of a rational function from its graph.

Page 321: 7,8

• Find the vertical asymptotes (if any) of a rational function from its formula.

Page 322: 9-17 odd

• Find the horizontal asymptote (if any) of a rational function from its formula.

Page 322: 9-17 odd

• Find the slant asymptote (if any) of a rational function from its formula.

Page 322: 49-55 odd

• Find the $x$-intercepts and $y$-intercepts of the graph of a rational function from its formula.

Page 321: 1-5 odd

• Graph a rational function using the procedure outlined in class.

Page 322: 25-47 odd