Topic Checklist for Test 2
College Algebra

Format

- The exam will be 5 pages long.
- It is a paper and pencil exam – it will not be on the computer.
- You will need to show your work.
- You may use a scientific or graphing calculator.
- The exam should last you around 50 minutes, but it is not timed. That said, you must finish the exam after you begin it and cannot leave part way thru and then complete it later.

Basic Content

- You are responsible for sections 12.1, 12.2, 12.3, 14.1, 16.2, and 17.1
- In addition to the material in the sections, you are responsible for all of the basic facts you have learned since kindergarten. These include the following facts:
  - Barack Obama is the President of the United States of America
  - $-1^2 = -1$.
  - " $\dfrac{a}{0}$ is undefined "
  - You must be able to read and interpret quotes.

Where You Should Be

- You should plan to finish your work on Academic Systems two days prior to the exam (or early on the day before the exam at the latest). You should plan to have your homework done by a decent hour on the day before the exam.
- After completing your homework, you should plan on spending 2 to 5 hours studying for this exam (more time is certainly appropriate when necessary).
- A good way to practice is to work thru the practice tests at the end of each section *with your book* closed.
- Remember, the exam is closed book and closed note. It is also timed. I recommend that you study under the same or similar constraints.

Topics

Section: 12.1: Exponential Functions

- You will need to be able to recognize and graph exponential functions (including growth and decay).
- You need to know that *e* is an irrational number – that is, it CANNOT be written as a fraction.
- You need to be able to work with applications of exponentials – including the compound interest formula.
- You must be able to solve exponential equations.

Section: 12.2: Logarithms and Their Properties

- You must be able to convert between exponential and logarithmic forms.
- You should be able to graph log functions.
- You MUST know your log properties (see the example problem).

The Question: Will I need to have my log properties memorized?

The Answer: You will need to have them memorized enough to be able to fill in the blanks on the following question. (The answers are on page 252 and 270)

***Assume $b > 0$ and $b \neq 1$. Furthermore, assume $u > 0, v > 0$, and *n* is a real number.

Property 0: _____ is the same as _____.

Property 1: $\log_b(u \cdot v)$ = _____.

Property 2: _____ = $\log_b(u) - \log_b(v)$.

Property 3: _____.

Property 4: _____ = _____, for *x* > 0.

Property 5: _____ = *n*, for any real *n*.

Property 6: _____ (Change of Base)

Section: 12.3: Applications of Logarithms

- You must understand logs with base 10 and base *e*. This includes being able to evaluate them on the calculator.
- You must know and be able to use the change of base formula.
- You must be able to solve log equations.
- You must be able to solve exponential equations.

The Quote: I always give the following quote that gives John Napier's reason for inventing the logarithm.

Seeing there is nothing that is so troublesome to mathematical practice, nor that doth more molest and hinder calculators, than the multiplications, divisions, square and cubical extractions of great numbers ... I began therefore to consider in my mind by what certain and ready art I might remove those hindrances.

Note: You will also need to know your properties of exponents.

Another cool question is:

If $\log_b(x) = 5$ and $\log_b(y) = -2$, then: Find the values for (a.) $\log_b\left(\dfrac{y}{x}\right)$ and (b.) $\log_b\left(\dfrac{y}{b\,x^3}\right)$.

The answers are (a.) -7 and (b.) -18

Section: 14.1: Polynomials

- Know the vocabulary of polynomials including:
    - degree
    - leading coefficient
    - coefficients
    - constant, linear, quadratic, cubic
    - descending order
    - and much, much more.
- Be able to recognize when graphs are of polynomials with even degrees or odd degrees and have positive or negative leading coefficients.
- Be able to determine and graph functions that are even (symmetric about the *y* axis) or odd (symmetric about the origin).
- You should be able to graph polynomials (by hand) that are "easily" factored. A couple of examples include $f(x) = (x+3)(x^2 - 25)$ and $g(x) = -(x^2 - 1)(x^2 - 5x + 6)$ (don't forget the "-").
- Be able to recognize vertical and horizontal translations from their graphs and from the equations.
- Be able to recognize and identify all of the important characteristics on the graph of a rational function.
- You should be able to identify the following from the equation
    - *x*-intercepts
    - *y*-intercepts
    - vertical asymptotes
    - horizontal asymptotes
- You should be able to find the domain and range if <u>given the graph or equation</u> of a rational function.

16.2: Matrices

- Algebra of matrices
    - Basic properties of matrices
    - Equality of matrices and addition, subtraction, and scalar multiplication of matrices
    - Product of matrices
    - The inverse of a matrix
- The Gauss-Jordan method
    - Linear systems and matrices
    - The Gauss-Jordan method

17.1: Sequences and Series

- Arithmetic sequences
    - Definition and notation for a sequence
    - Arithmetic sequences and finding the nth term
    - Sum of the first n terms of an arithmetic sequence
- Geometric sequences
    - Geometric sequences and finding the nth term
    - Sum of the first n terms of a geometric sequence
    - Sigma notation for a sum
    - Finding an "infinite sum" for certain geometric sequences