Wilfrid W. Csaplar Jr. College Algebra Review Sheet for the Final Exam

This review sheet is intended to cover everything that could be on the exam; however, it is possible that I will have accidentally left something off. You are still responsible for everything in the chapters covered except anything that I explicitly say you are not responsible for. Therefore, if I left something off of this sheet, it can still be on the exam. There will be no multiple-choice questions. Most of the questions will be like the ones in the homework assignments, and possibly a few definition questions, but I am more likely to ask questions that make you use the definitions rather than recite them. I will probably ask one of the questions from the book at the end of the chapters.

The final exam will be Tuesday 11/24 at 10:00 until 12:00. But I will allow you to start early or late, just like the other exams. The review session will be Sunday 11/22 at 5:00 on Zoom.

Chapter 3.2: No how to divide polynomials using **long division** and **synthetic division**. (I guarantee you will be required to use synthetic division and there will lots of times you will want to use it.) Know the **Remainder Theorem** and the **Factor Theorem**. *The former implies the latter and can be an easier way to find p(c) than substituting c into the polynomial. Note that the following statements are all saying the same thing 1) The real number c is a zero of p(x). 2) p(c)=0. 3) x=c is a solution to p(x)=0. 4) (x-c) is a factor of p(x). The point (c,0) is an x-intercept of the graph y=p(x).* Note that the most number of real zeros is n for an **n-degree polynomial**.

Chapter 3.3: Know how to use **Cauchy's Bound** to find the limits of the real zeros. Know how to list all possible rational zeros using the **Rational Zeros Theorem**. Ignore the parts about the graphing calculator. You will not be graphing in this part of the exam. Know how to use **Descartes' Rule of Signs** to find the most number of positive or negative zeros. *You will want to be doing synthetic division to find the zeros. Turn in all of your work, including failed attempts. That way, if you do not solve it, or if you make errors, I can give you partial credit for your failed attempts.*

Chapter 8.1: Know what a **linear equation in n variables** is. Also, know what a **system of linear equations** is. Know how to write the answer to a system of equations as an **ordered pair** $(x_1, x_2, x_3 \ldots x_n)$. Know what an **identity** and a **contradiction** are and what they mean. *I will NOT ask you to graph the system. I did that to help you understand how we can get an infinite number of solutions, one solution, and why there are more than one way to get no solution.* Know how to get a **parametric solution to a system of equations**. That requires finding a **free variable** and setting it = t. *Normally, it will not matter which variable you choose. However, as we saw in class on the 16th, sometimes we cannot choose one variable. It is usually easiest to set the last variable = t when you have it in triangular form.* Understand what is meant by **consistent systems, inconsistent systems, dependent system, independent system, overdetermined,** and **underdetermined.** Be able to use the "moves" described in **Theorem 8.1** to manipulate a system of equations. *The first two should be obvious why they work. It makes no difference what order the equations are written in and multiplying both sides by a number changes nothing. Adding a multiple of one equation to another will not affect anything either.* Know how to use **Gaussian Elimination** (*the aforementioned three moves*) to get the system in **triangular form**. *Triangular form is easier to understand than it would appear from the bottom*

of Page 557. Each equation has fewer variables than the one above it. And the coefficient of every first variable is 1. It looks like a triangle. **Hints on getting the system into triangular form:** Get the first equation to have a 1 as the coefficient of the first variable. This can be achieved by swapping equations or dividing the equation by the first coefficient. Then use the first equation to eliminate the first variable from the other equations. Now ignore the first equation. What you have left is a system of equations with at least one fewer variable(s). Repeat the process on that smaller system. Continue until your last row is either the "last variable = a number", or "a number = 0", or "0 = 0". In the first case you have one solution. In the second case, you have no solution, and in the third case, you have an infinite number of solutions. If you have one solution or an infinite number of solutions, work from the bottom up. Substituting what you found in one row, up into the row above it. **Hints on setting up the system in word problems:** Use letters which make sense for words. For example, if you are doing a chemistry problem with a 10% solution and a 40% solution, use T for the amount of the former and F for the amount of the latter. So, if you want 10 gallons of 30% solution, you have two equations. The first is the obvious one, T+F = 10. The second one you add up the amount of dissolved ingredients. Since 10% of T is the ingredient and 40% of F is the ingredient, that means .1T + .4F = the amount you want which is .3(10).