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 may have inadvertently overlooked something. 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 on the homework assignments and quizzes. There will **not** be a choice of questions to choose from. <u>You will not get credit for answers given without work.</u>

The optional review session for this test will be at a room and time to be announced I plan to have it in the "normal room," Richardson 021, but I will announce the location later.

You will NOT be allowed to have a graphing calculator on the exam.

The final is comprehensive. This statement means I will try to pull evenly from each test and spread the material out evenly over the semester. The one exception is that there will definitely be at least one question from each of the three sections below. Since we used most of the material from Chapter 1 in the later chapters, the material from that chapter should be easy for you to study for and should raise your grade.

Section 3.4: When plotting equations that have an absolute value in them, find all points which have the absolute value = 0. Then split the function into two functions, one with a domain of $X <$ that value and the other with a domain of $X \geq$ that value. Making sure to have the appropriate sign. For example, to plot F(X) = |X + 1|, the absolute value is zero for X = -1. Thus, plot $F(X) = \begin{cases} -(X+1) & X < -1 \\ X+1 & X \geq -1 \end{cases}$ When graphing quadratic functions, you need to get it into the format F(X) = a(X-h)^2 + k. If a is positive, then the point (h,k) is the minimum of the function. If a is positive, then the point (h,k) is the maximum. Suppose that we have **F(*X*) = -2*X*^{2} + 8*X* - 10.** First factor out the -2 from the first two terms. This yields F(X) = -2(X^2 - 4X) - 10. Since coefficient on the X is -4, h must be -½ of -4 = 2. We now have F(X) = -2(X-2)^2 +k. Now we multiply out the square and distribute the -2. We get F(X) = -2(X^2-4X+4) + k = -2X^2 + 8X -8 + k. Therefore, k = -2. The maximum is (2, -2). If you go right or left 1 unit from there, you change Y by 1^2* a = 1^2*(-2) = -2. If you go two units right or left, you change Y by 2^2*a = -8. Therefore, other points are (1, -4), (3, -4), (0, -10), and (4, -10). The -4 = -2 -2 = maximum for Y + change in Y. The -10 = -2 - 8.

Section 3.5: Functions have the normal properties you would expect of +, -, *, and /. For example, (F+G)(X) = F(X) + G(X). (F-G)(X) = F(X) - G(X). (FG)(X) = F(X)*G(X). (F/G)(X) = F(X)/G(X) if G(X) $\neq$0. (F$\circ$G)(X) is the composite and is defined as F[G(X)]. So if F(X) = X^2 and G(X) = X+1, then (F$\circ$G)(X) = [X+1]^2. Do not worry about the domain and range of the composite functions. A vertical shift of a function is achieved by adding or subtracting a constant. Adding 3, for example, will move the line up three spaces. Horizontal shifts of a function are achieved by replacing X with X+#. If # is 1 and F(X) = X^2, then G(X) = (X+1)^2 will move the curve to the **left** one space. A reflection is achieved by multiplying the function by -1. Ignore vertical expansion and contraction.

Section 3.6: A function is *one-to-one* if every value of Y in the range of the function has exactly one X in the domain. To determine if it is one-to-one, try solving for X. If you can, and there are no values of Y that result in more than one X, then it is one-to-one. You will also have found the inverse function. The other way to test if it is one-to-one, is to do the horizontal test. If any horizontal line crosses the function twice, it is not one-to-one. All increasing and decreasing functions are one-to-one, but some other functions are one-to-one too. If it is one-to-one, **even if you cannot solve for *X* because the function is too complicated**, then the inverse function exists. The inverse function of F(X) is represented by $F^{-1}(Y)$. $F^{-1}(Y)$ = the values of X that give F(X) = Y. For example, if F(X) = X^3, then $F^{-1}(Y) = X^{1/3}$. **By definition, $(F^{-1}\circ F)(X) = X$ and $(F\circ F^{-1})(X) = X$.**