Wilfrid W. Csaplar Jr. College Algebra Review Sheet for Exam 4

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. You will not get credit for answers given without work.

The optional review session for this test will be **Tuesday, 11/18 at 8:45**. I plan to have it in the "normal room," Richardson 021, but I will announce the location later.

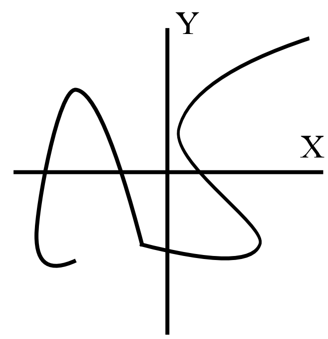
You will NOT be allowed to have a graphing calculator on the exam.

Class on Friday, 11/21 is cancelled. (I will be with the Economics Club in NYC.) The material we would have gone over on that day, section 3.5, will be gone over on Monday, 12/1 and quiz #28 will be taken 12/1. In the original syllabus, we would have gone over exam #4 on 12/1 and taken quiz #29. You will get exam #4 back with an answer key and quiz #29 will be taken on 12/3, when no quiz was scheduled.

Section 3.1:
Plotting points is easy if you remember to place a scale on the axes and label them. (Forgetting to do that will cost you points.) The horizontal axis is the x-axis. When plotting a point like (3,-2), the x-coordinate is the first one because x comes before y. Start at the origin (where the x-axis crosses the y-axis), and go right 3 then up -2, which is the same as down 2. If you are plotting any relationship between Y and X, for example, $Y = X^2 - 4$, replace X with numbers and find Y. Then plot the point (x, y). **Be careful, if $X = -3$, then Y would be $(-3)^2 - 4 = 9 - 4 = 5$. This is not the same as $-3^2 - 4 = -9 - 4 = -13$.** To find either x-axis symmetry or y-axis symmetry, replace the **other** variable with its negative. So for x-axis symmetry, replace Y with $-Y$. As described above, be careful when substituting negative variables into equations. For symmetry about the origin, replace both variables with their negative. Then determine if you can get the new equation back to the original equation. For example, if you are testing $Y = X^3$ for symmetry about the origin, $-Y = (-X)^3 = (-X)(-X)(-X) = -X^3$. Multiply both sides by -1 and get $Y = X^3$. It does have symmetry about the origin. It does not have symmetry about either axis. However, if it has symmetry around both of the axes, then it must have symmetry around the origin. Memorize the distance formula. It is $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$. **Note that you cannot split the radical into two parts because there is an addition in the middle.** Also, even though it does not matter for this equation if you take x_1 from one point and y_1 from the other point, do not do that because other similar formulas will change if you do that switch. A circle with a radius of r and centered at (h,k) is written in the general formula of $(X-h)^2 + (Y-k)^2 = r^2$. **Note the formula subtracts h and k.**

Section 3.2:
There are three forms for straight lines. They are the standard form, AX + BY = C; the slope-intercept form, Y = mX + b; and the slope-point form, $Y - y_1 = m(X - x_1)$. The easiest to plot is the slope-intercept form. Start on the y-axis at b and right 1 unit and up m units. If m is a fraction like 2/3, then go right the denominator and up the numerator. This would mean right 3 and up 2. If m is negative then go right 1 and down |m|. Going left is just like going right, except you go down m for every 1 you go left. The slope-point form is most useful for finding a line through a point with a certain slope. The point is (x_1, y_1) and the slope is m. However, you can go directly to the slope intercept form by substituting the point into the equation for X and Y and solving for b. For example, if you wanted a line with slope of 2 through (3, -1) then you know Y = mX + b gives -1 = 2*3 + b. Subtracting 6 from both sides gives -7 = b. Thus, the equation is $Y = 2X + -7$.
<u>Properties of the slope:</u> 1) It is defined as rise/run = $\Delta Y/\Delta X = (y_2-y_1)/(x_2-x_1)$. **(If you reverse y_2 and y_1, then you must reverse x_1 and x_2.)** 2) If the |slope| increases, then the line is steeper. 3) Lines with positive slopes, slope up. Lines with negative slopes, slope down. 4) Two lines are parallel if they have the same slope. 5) Two lines are perpendicular if the product of the slopes is **-1**.

Section 3.3:
An equation or relationship is only a function if every value of *X* has exactly one value of *Y*. A function can sometimes be written as a set of ordered pairs. For example, the set {(3, 2), (2, -1), (-2, -1), (1, 2)} is a function. The easy way to remember which is the domain and which is the range, is to be alphabetical. The letter "d" comes before "r." If you plot points of an equation and find an X with two or more values for Y, then it is not a function. You can check this with a vertical line. The graph on the right-hand side is not a function because it fails the vertical line test. If you can't plot it, then solve for Y. If you get two values, then it is not a function. For example, $Y^2 = X^2$. Is not a function because solving for Y will yield $Y = \underline{+}X$. So, if X = 3, then Y = 3 or -3. Functional notation could say F(X) = 3X -4. This is read, "F of X equals 3X -4." When plotting a function, always let Y equal F(X). Sometimes, we will use other letters like, f, G, or g, to symbolize a function. In Economics, we might say price (P) is a function of quantity (Q). This would be written as P(Q) = 100 - 2Q. Note that it is normal to represent a variable with an italic letter.



Section 3.4:
Graphing functions is identical to graphing equations that say Y = . . . because F(X) is the same as Y. A function is considered to be an increasing function if for all a and b in the domain, b >a ⇒ F(b) > F(a). A function is considered to be a decreasing function if for all a and b in the domain, b >a ⇒ F(b) < F(a). A function is considered to be a constant function if F(a) = F(b) for all a and b in the domain. Graphing of quadratic functions will be on the final, but not on exam 4. You will get a review sheet for the final sometime soon after you get back from Thanksgiving break.