Worksheet 1.1,2 (30 points) NAME _____

ATTACH CAREFUL WORK TO SUPPORT ANSWERS. BOX ANSWERS. Each problem is worth 2 points.

1. Express the solution of the following inequality in terms of intervals: $8x^2 + 14x \geq 15$.

2. Express the solution of the following inequality in terms of intervals: $\frac{2}{3-x} \geq \frac{1}{x+5}$.

3. Determine the value(s) of *k* so that the point $P(4,-5)$ is on the line $k^2x - ky = 6$.

4. Determine an equation of the line through $(1,4)$ and perpendicular to the line with equation $5x + 2y = 17$.

5. If $A(4,7), B(-6,3), C(5,-2)$, determine an equation of the line through *C* and the midpoint of $\overline{AB}$ (Note that this is called the *median* from C to $\overline{AB}$).

6. Use interval notation to state the domain of the function $f(x) = \frac{1}{(x-5)\sqrt{x^2-4}}$.

7. Find an equation for the **altitude** (the line segment that contains one vertex of the triangle and is **perpendicular** to the line through the other two vertices) from A to $\overline{BC}$ of the triangle with vertices $A(-3,1), B(2,5), C(4,-3)$ and then find the area of the triangle.

8. Determine a complete set of values for *t* so that the slope of the line through $(3t-1, t+5)$ and $(t+2, 1-2t)$ is no more than 2.

9. $f(x) = 3x^2 - 5x - 1$. Use what you know about the composition of functions and simplification of algebraic expressions to determine the simplest form of the difference quotient $\frac{f(x+h) - f(x)}{h}$.

10. $f(x) = x^2 + 2x - 5$ and $g(x) = 7x - 6$. Find the simplest form expressions for $f(g(x))$ and $g(f(x))$.

11. Determine the center and radius of the circle with endpoints of its diameter at $A(5,-2)$ and $B(-3,7)$ and then write an equation for that circle.

12. Determine an equation of the circle that is tangent to both axes, has its center in the fourth quadrant and passes through the point $(8,-9)$. (There are actually two such circles, if you give me both you will earn a bonus point.)

13. Express the side, s, of an equilateral triangle as a function of its area, A. Hint: solve an area formula that uses *s* as its variable for *s*.

14. An open box is to be made from a rectangular piece of cardboard with dimensions 18 inches by 32 inches by cutting identical squares of area x^2 from the corners and then turning up the sides. Express the volume *V* of the box as a function of *x* and name the open interval on which the value of *x* must occur (domain).

15. Decompose $f(x)=\sqrt{\cos\left(3x^2+1\right)}$ into three functions (each simpler than the original function) so that $f(x)=a\left(b\left(c(x)\right)\right)$.