**Unit 3 Study Guide Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**3.1-3.7 Table # \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**3.1: Symmetry and Coordinate Geometry**

1. (a) Describe how you know whether a graph is symmetric about the origin.

(b) Determine whether the graph is symmetric with respect about the origin.

$f\left(x\right)=5x^{2}+6x+9 $.

2.Briefly describe how you know whether a graph is symmetric to the following lines:

(a) $x$-axis (b) $y$-axis

(c) $y=x$ (d) $y=-x$

3. Determine whether the graph, $\left|y\right|=2x^{2}$, is symmetric with respect to the $x$-axis, the $y$-axis, the line $y=x$, the line $y=-x$, or none of these.

**3.2: Families of Graphs**

4. List and sketch the seven parent graphs we learned in Pre- Calculus.

5. Identify and graph the parent function of $f\left(x\right)=3\sqrt{-x}+1$. List the transformations you would perform to graph $f (x)$, than graph $f (x)$.

6. Identify and graph the parent function of $f\left(x\right)=-\left(x-4\right)^{2}-1$. List the transformations you would perform to graph $f (x)$, than graph $f (x)$.

**3.3: Graphs of Nonlinear Inequalities**

7. Graph $y>-\frac{1}{2}\left|x-1\right|+2$. 8. Graph $y\leq -\frac{3}{2}x^{3}-1$.

9. Solve the following inequalities

a) $|3x+12|\geq 42$ b) $|3x-4|\leq x$

**3.4: Inverse Functions and Relations**

10. Graph $f\left(x\right)=-(x+2)^{2}-5$ and sketch its inverse. State whether the inverse is a function. Support your answer graphically.

11. Find $f^{-1}(x)$. Then state whether $f^{-1}(x)$ is a function.

$$f\left(x\right)=\frac{1}{\left(x-1\right)^{2}}$$

**3.5: Continuity and End Behavior**

12. Determine whether $y=\frac{x+3}{\left(x-3\right)^{2}}$ is continuous at $x=-3$. If not, indicate and sketch the type of discontinuity using your graphing calculator.

13. Determine whether $y=\frac{x+1}{x-2}$ is continuous at $x=-2$. If not, indicate and sketch the type of discontinuity using your graphing calculator.

14. Determine the end behavior, interval(s) of increase, and decrease for the function using your graphing calculator.

$f\left(x\right)=x^{3}+3x^{2}-9x$.

**3.6: Critical Points and Extrema**

15. Determine and classify the extrema of $f\left(x\right)=x^{4}+5x^{3}+3x^{2}-4x.$

**3.7: Graphs of Rational Functions**

15. Determine the vertical and horizontal asymptote of the equation: $f\left(x\right)=-\frac{1}{x-3}+2$. Then graph.

16. Determine the vertical and horizontal asymptote of the equation: $f\left(x\right)=\frac{x^{2}}{x^{2}-1}$. Then graph.

17. Identify the hole and sketch the graph.

$$j\left(x\right)=\frac{x^{2}+5x+4}{x-1}$$

18. Identify the zeros and asymptotes. Then sketch the graph.

$$h\left(x\right)=\frac{x-3}{x^{2}-9}-4$$