Pre Calculus
Study Guide: Chapter 3

1. Determine whether the graph of $y = 2x^2$ is symmetric with respect to the origin, x-axis, the y-axis, the line $y = x$, the line $y = -x$, or none of these. Show your work.

2. Identify and graph the parent function of $g(x) = -2|x - 3| - 1$. List the transformations you would perform to graph $g(x)$, then graph $f(x)$ and $g(x)$.

3. Graph $y < \sqrt{-\frac{1}{5}x} + 2$.

4. Solve the following inequality.
   $|3x + 12| \geq 42$

5. Graph $f(x) = -(x + 2)^2 - 5$ and sketch its inverse. Show the table of values. (You may use your graphing calculator)

6. Find $f^{-1}(x)$. Then state whether f(x) and $f^{-1}(x)$ are inverse functions algebraically.
   $f(x) = \dfrac{1}{(x - 1)^2}$

7. Determine whether $f(x) = \frac{x+1}{x-2}$ is continuous at $x = -2$ using the continuity test.

8. Determine the end behavior, classify and identify the extrema, and identify the interval(s) for which the function is increasing and decreasing using your graphing calculator.
   WINDOW: $[-10, 10]$ by $[-50, 50]$

   $$f(x) = x^3 + 3x^2 - 9x$$

9. Determine the vertical and horizontal asymptote of the equation. Then graph it.

   $$f(x) = \frac{(x - 2)^2}{x^2 - 9}$$

10. Identify the zeros and asymptotes. Then sketch the graph.
    $$j(x) = \frac{x^2 + 5x + 4}{x - 1}$$

11. Identify the hole and sketch the graph.
    $$h(x) = \frac{x - 3}{x^2 - 9} - 4$$

12. Give a sample graph of each type of discontinuity:

    a) Point discontinuity
    b) Jump discontinuity
    c) Infinite discontinuity