Name:_____ Day/Time Class Meets:_____

Instructions:

- Use a pencil only.
- Work problems completely and clearly in the space provided. Place your answer(s) on the line(s) provided.
- Use backs of sheets for additional writing space, if necessary.
- Credit (partial or full) will be given only if sufficient steps leading to the solution are shown. In most problems, no credit will be given for answers only.
- No books or notes may be used on the exam.
- This exam has a total of 5 pages (including the cover page). Check to make sure you have a complete exam.
- Erase or cross out work that you do not want graded.

1. Solve the following:

   (a) $\dfrac{3}{x-4} + \dfrac{2}{x+4} = \dfrac{19}{x^2-16}$.

   (b) $\sqrt{6x+7} - 2 = x$.

2. Use the leading term test to determine the end behavior of the function below. Be sure to give a good explaination of how you reached your solution:

$$g(x) = -27x^4 - 36x^3 + 26x - 1.$$

3. If possible, determine whether the function $g(x) = x^3 - 3x^2 + 2x - 3$ has a real zero between $x = 2$ and $x = 3$.

4. Find the zeros of $h(x) = 2(x+3)^2(x-7)^3(x+1)$. State their multiplicities, and determine if the graph of h(x) crosses the x-axis at each zero or not.

5. Use long division to determine whether or not $x+1$ is a factor of $h(x) = x^3 - x^2 - 17x - 15$.

6. Find a polynomial of lowest degree that has $2, 3+4i$, and $3-\sqrt{2}$ as zeros.

7. Solve the following inequalities, and give your answer in **interval notation**. Then, **graph the solution set.**

   (a) $|-2x+3| \leq 5$

   (b) $2x+4 \leq -3$ or $x-1 > 2$.

8. Use synthetic division to check whether or not -3 is a zero of

$$f(x) = 3x^3 + 5x^2 - 10x + 72.$$

NO CREDIT for any other method.

9. Find the vertical asymptotes, horizontal aymptotes, and the domain of the following function (Be sure to say enough to justify your answer):

$$g(x) = \frac{7x^2 + 3x - 1}{2(x^2 - 2x - 35)}.$$

10. Kayde and I take Molly to the Doggone Fun Dogpark which charges a \$10 entry fee and \$1 for every hour Molly plays. The Happy Tails Dogrun only charges \$2.50 for every hour Molly plays. How long can Molly play before the Doggone Fun Dogpark is cheaper than the Happy Tails Dogrun? (Be sure to show all of your work.)