

Name: \_\_\_\_\_

**CALCULATORS ARE NOT PERMITTED**

Directions: You must show all work in order to receive full credit. Where it is impossible to show work, explain your steps in words. Where rounding or truncating is required, do so to the thousandths place. Write all answers in the appropriate boxes.

**NOTE: You have approximately 54 minutes to complete 8 problems. That is just under 7 minutes per problem. Pace yourself accordingly.**

1. Find the domain, vertical asymptotes, horizontal asymptotes, slant asymptotes, holes, x-intercepts, and y-intercepts of the function and sketch the graph. If any of the above does not exist, write "none" in the designated box.

$$f(x) = \frac{10x^2}{4x^2 - 4}$$

2. Perform the operation and write the result in standard form.  $\frac{5}{2+i} + \frac{3}{4-3i}$
3. Find the domain, vertical asymptotes, horizontal asymptotes, slant asymptotes, holes, x-intercepts, and y-intercepts of the function and sketch the graph. If any of the above does not exist, write "none" in the designated box.

$$f(x) = \frac{x^3 + 3x^2 - 18x}{x^2 - 5x + 6}$$

4. Divide the polynomials. You may use whichever method you deem fit.

$$\frac{x^4 - 3x^3 + 4x^2 - 6x + 3}{x^2 + 2}$$

5. Divide the polynomials. You may use whichever method you deem fit.

$$\frac{6x^4 - 4x^3 - 27x^2 + 18x}{x - 2}$$

6. Find all the zeros of the function and write the function as a product of linear factors.  $g(x) = x^3 - 13x^2 + 144$
7. Given that  $1 - i$  is a zero of  $f(x) = 4x^4 - 11x^3 + 14x^2 - 6x$  find all of the zeros of the function.
8. Find all of the real zeros of the function.  $f(x) = 9x^4 - 9x^3 - 58x^2 + 4x + 24$