MTH 1000, Exam 2 Name: _____

Time: 75 minutes, Max Points: 100 [+5 Bonus]

Print your name clearly. Show **all work clearly** and in order. Use of books, notes, calculators, or any other resource is **not** permitted. Attach additional pages of work if necessary.

1. [20 points] Divide the polynomials into quotients and remainders.

   (a) $\frac{4x^3-2x^2+x+4}{x-2}$

   (b) $\frac{6x^2-2-2x}{3x-1}$

2. [20 points] For each function, find the domain, range, all intercepts, and all asymptotes. Then, graph the function

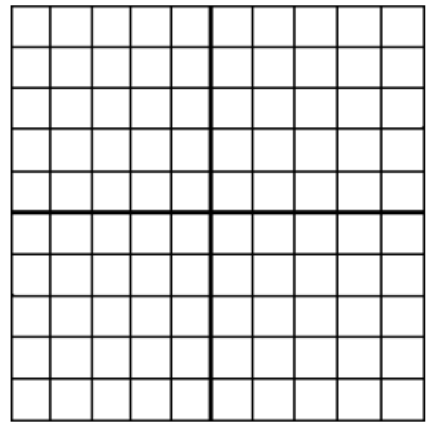
(a) $f(x) = x^4 - 3x^3 - 4x^2$

Domain:

Range:

Intercepts:

For each x-intercept, write whether the graph crosses or touches the x-axis.



(b) $f(x) = \frac{x-1}{x^2-4}$

Domain:

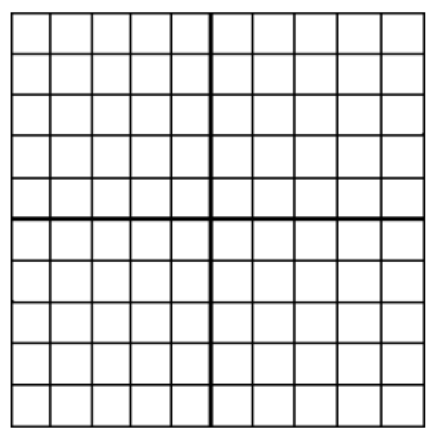
Range:

Intercepts:

Vertical Asymptotes:

Horizontal Asymptotes:

Oblique Asymptotes:



3. [10 points] Let $f(x) = \frac{1}{x}$ and $g(x) = \sqrt{x}$. Find the formula, domain, and range for each of the following.

(a) $(f \circ g)(x)$

(b) $(g \circ f)(x)$

4. [10 points] Find the inverse of each function if possible and write the domain and range of the inverse. Otherwise, prove that the inverse does not exist.

(a) $f(x) = \frac{2}{x+2}$

(b) $f(x) = \frac{1}{x^2}$

5. [10 points] Solve the exponential equations.

(a) $2^{2x-1} = 4$

(b) $5^{x^2+8} = 25^{3x}$

6. [10 points]Find the exact value of each logarithm.

(a) $\log_4 4$

(b) $\log \sqrt[3]{10}$

7. [10 points] Solve each logarithmic equation.

(a) $\log_5(x+2) = 2$

(b) $\log(x) + \log(x+15) = 2$

8. [10 points] Solve each equation. If finding the exact solution is infeasible, leave your answer in terms of log or ln.

(a) $\log_4(x^2-9) - \log_4(x+3) = 3$

(b) $\log_a(x-1) - \log_a(x+6) = \log_a(x-2) - \log_a(x+3)$

Bonus [+5 points]

(a) Find the value of $\log_2 4 \cdot \log_4 6 \cdot \log_6 8 \cdot \log_6 8 \cdot \log_8 10$.

(b) Find the value of $\log_2 4 \cdot \log_4 6 \cdot \log_6 8 \cdots \log_{2n}(2n+2)$