Name: _____   **Score:** _____ / 100

Student ID: _____

DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO

|	1	2	3	4	5	6	7	8	9	10	Total
✓											27
Score											
Pts. Possible	3	3	3	3	3	3	3	3	3	3	29

INSTRUCTIONS FOR STUDENTS

- Questions are on both sides of the paper. This is an 10 question exam.
- Students have 2 hours and 15 minutes to complete the exam.
- The test will be out of **27 points**. The highest possible score will be **29 points**. You must complete 9 problems for credit (3 points each, 27 points total). If you wish, you can attempt a 10th problem for extra credit. That question will be out of 2 points, for a maximum of 29 possible points.
- In the above table, the row with the ✓ should be marked for the 9 questions you want graded. Mark **EC** for the extra credit problem.
- You may complete parts of problems, as partial credit will be given based on correctness, completeness, and ideas that are leading to the correct solutions.
- **PLEASE SHOW ALL WORK**. Any unjustified claims will receive no credit. Clearly box your final answer.
- No notes, textbooks, phones, calculators, etc. are allowed for the exam.
- The back of the test can be used for scratch work.

GOOD LUCK!

1) Use graph transformations to sketch the following graph. **USE THE GRAPH PAPER FOR YOUR FINAL ANSWER.**

$$f(x) = -(-x+1)^3 + 2$$
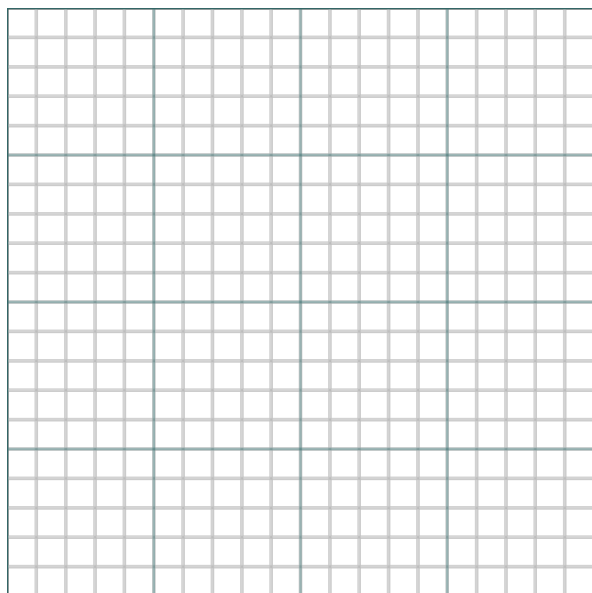
2) Use polynomial or synthetic division to divide the polynomials:
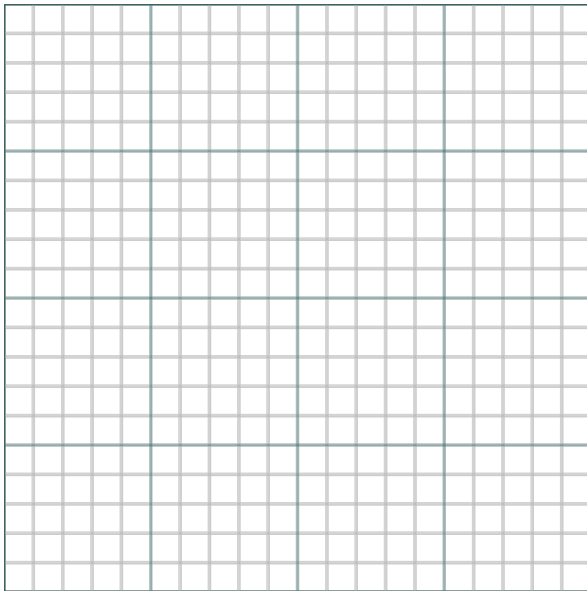
$$\frac{x^4 - 3x^3 + 3x^2 - 3x + 2}{x - 2}$$

3) Put the following quadratic function in vertex form. State the vertex and axis of symmetry.

$$f(x) = 2x^2 - 20x + 48$$

4) Identify the asymptotes and zeros of the function. Sketch the graph. **USE THE GRAPH PAPER FOR YOUR FINAL ANSWER.**

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

5) Solve the following rational inequality, and put the answer in **interval notation**:
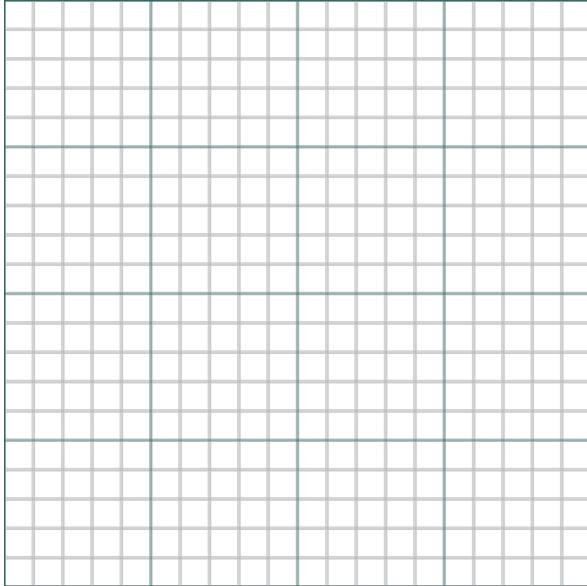
$$\frac{5}{2-x} \le \frac{3}{3-x}$$

6) Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = \sqrt{x+2}$, and reduce completely.

7) Write the inverse function, $f^{-1}(x)$, for $f(x) = 2x + 9$, and check that your result is the inverse.

8) Solve the following equation for x: $2e^{2x} + 5e^x - 12 = 0$

9) Graph the following function: $f(x) = -\ln(x-1) + 2$. **USE THE GRAPH PAPER FOR YOUR FINAL ANSWER.**

10) A bacteria culture is being created and the population is governed by the equation $P(t) = P_0 e^{kt}$, where P_0 and k are constants.

a) If the initial population is 20 bacteria, and after 5 minutes there are 100 bacteria, determine k in the $P(t)$ function (*Advice: You can leave the* ln *in the final answer*).

b) Find $P(10)$. What does this quantity mean?

c) Find the time, t in minutes, to reach 200 bacteria (*Advice: You can leave the* ln *in the final answer*).

THIS PAGE IS LEFT BLANK FOR ANY SCRATCH WORK

END OF TEST