Test3 Review, MAT 1375 Professor Chiu

ID:_____ Name:_____

- This test consists of 10 set of questions for a total of 100 points.
- You have 100 minutes to complete the test.
- Scientific calculators are allowed.
- Show all work and justify your answers.
- Wishing you success.

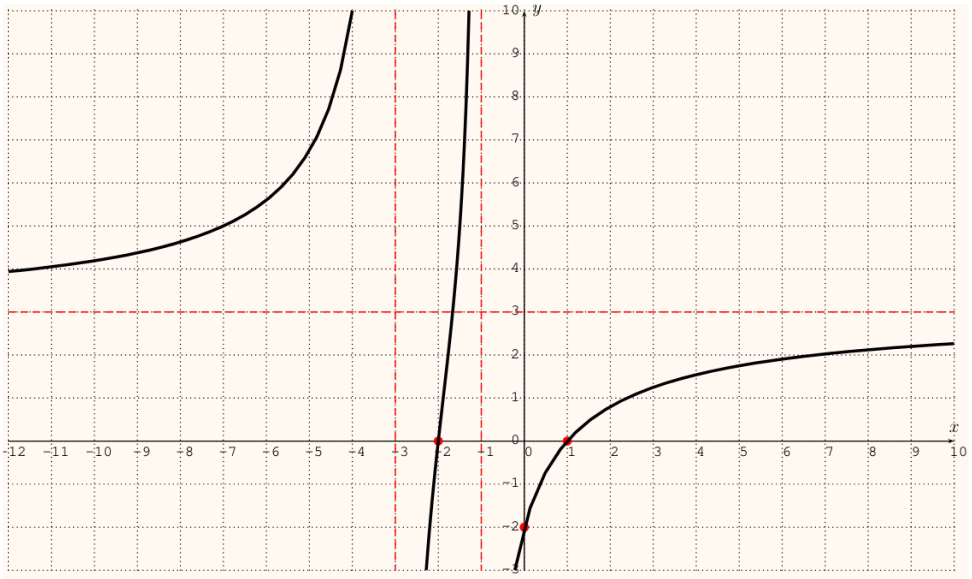
1. (8 points) Use the 4-step strategy to find the inverse of the function

$$f(x) = \frac{x-1}{x+2}.$$

2. (8 points) Solve the inequality. Express the solution both on the number line and in interval notation.

$$\frac{x-3}{x^2+4x-5} > 0.$$

3. (8 points) The graph of $f(x) = \frac{p(x)}{q(x)}$ is displayed below, where $\deg(p(x)) = \deg(q(x)) = 2$. All intercepts and asymptotes are at integer values. Find all intercepts, asymptotes, and a formula for $f(x)$.



4. (8 points) Given a function $f(x) = x^2 + 5x + 2$. Find $\frac{f(x+h)-f(x)}{h}$.

5. (8 points) Given $f(x) = x^3 + 5x^2 + x + C$ be a polynomial with an unknown real number C.

a) If $f(x)$ has a root $x = -2$, find this unknown real number C.

b) Find all remaining roots.

c) Sketch a complete graph of this polynomial, indicating the roots.

6. (12 points) In 2021, the population of a city is 80,000 people, and is growing at a rate of 5% per year.

(a) What will the population be in 2025?

(b) In what year will the population be triple?

7. (12 points) Solve the exponential equation $\mathbf{7^{2x+3} = 3^{x+1}}$.

8. (12 points) Given $f(x) = \ln(3x - 7)$. Find the domain, asymptotes, and x-intercepts of the function f, and then sketch its graph.

9. (12 points) Let $\boldsymbol{P = (-1, -3)}$ be a point on the terminal side of the angle $\boldsymbol{\theta}$. Find the values of the six trigonometric functions.

10. (12 points) Given a trigonometric equation $2\cos^2(x) + \sqrt{3}\cos(x) = 0$. Find all exact solutions in radians.