Directions: At the top of your Final Exam paper write the following statement and sign it.

"All work is my own. I am not using any outside assistance to complete this exam. I am not using a calculator or the internet to find or check answers. I am not providing assistance to another person taking this exam."

- Please have your camera on and your microphone muted. Webcams are required to be on for the duration of the Test.
- Please ask all questions to me privately in the chat window.
- Please read the directions to each problem carefully.
- Solutions should be written clearly and concisely on blank sheets of paper. All work must be shown to receive full credit. Answers without correct supporting work will receive minimal credit.
- No outside assistance of any kind is allowed. This includes using the internet to find answers, using your notes, having another person look at your work before submission, looking at another person’s work before submission, and/or sharing information in any way while completing the Final Exam.
- Calculators are not permitted. Points will be deducted for evidence of obvious calculator use and could result in receiving a 0 on the problem involved, and failing the exam.
- Webcams are required to be on for the duration of the exam.
- You will have 120 minutes to complete the Final Exam and an additional 15 minutes to upload your work on Canvas.

1) Given the function \( f(x) = \begin{cases} x^2 + 3 & \text{for} \quad x < -4 \\ -1 - x & \text{for} \quad -4 \leq x \leq 5 \\ -2 & \text{for} \quad x > 5 \end{cases} \), find the following.
   
   a. \( f(-3) \)
   
   b. \( f(5) \)

2) Write an equation for a function that has the shape of \( y = \sqrt{x} \), but is reflected over the \( x \)-axis and shifted left 5 units.

3) Solve: \( \log_2(x + 5) - \log_2(x - 3) = \log_2 x \)

4) Find: a. \( \log_8 \sqrt{8} \) b. \( \log 1000 \) c. \( \log_{27} \frac{1}{3} \) d. \( \log_4 \frac{1}{16} \)
5) Maria is selling her handmade jewelry on Etsy. In the month of April she sold a total of 68 pieces. Necklaces sold for $30 each, bracelets sold for $20 each and her sales totaled $1540. How many of each did she sell?

6) Write the slope-intercept equation for the line that passes through the point (1, 2) and is parallel to the line $5x - y = 17$.

7) Given the functions $f(x) = 1 - 3x$, $g(x) = -x^2 + 4x - 1$, and $h(x) = \sqrt{6x + 5}$, find and simplify the following.
   a. $(gf)(x)$
   b. $(h \circ g)(2)$
   c. $(f \circ g)(x)$

8) Find the domain of the following function:
   $$f(x) = \frac{x - 3}{x^2 + 5x}$$

9) For the function shown, find:
   a. Domain
   b. Range
   c. $f(0)$
   d. Intervals of increase
   e. Intervals of decrease

10) Solve:
   $$\frac{3y}{y+2} + \frac{6}{y} = \frac{12}{y^2+2y}$$

11) A gymnast dismounts the uneven parallel bars. Her height, $h$, in feet, depends on the time, $t$, in seconds, that she is in the air as follows: $h(t) = -16t^2 + 8t + 8$
   a. How long will it take the gymnast to reach the ground?
   b. When will the gymnast be 8 feet above the ground?

12) Solve: $\sqrt{x - 3} - \sqrt{x} = 3$
13) Solve: \(12 - |2x + 1| < 9\)

14) Solve: \(x^2 - 2x^3 - 8 = 0\)

15) Find and simplify the difference quotient for the following function: \(f(x) = x^2 - x\).

16) Solve, writing any non-real solutions in the form \(a + bi\): \(3 - x = x^2 - 3x + 7\)

17) For the function \(g(x) = x^2 - 4x + 5\)
   a. Find the vertex by completing the square.
   b. Graph the function, labeling the vertex and all x- and y-intercepts.

18) A conic section is given by the equation: \(9x^2 + 81y^2 = 81\)
   a. Identify the conic section.
   b. Sketch the graph labeling all relevant points.

19) Solve: \(x - 2 > -\frac{1}{x}\)

20) The custom rectangular frame for Lia's artwork is twice as long as it is wide. The sides of the frame have a uniform width of 2 cm so that 96 cm\(^2\) of the picture shows. What are the dimensions of the frame?