(15pts) NAME (printed neatly): ________________

(10pts) Section Number (circle correct section):  504 (12:40pm)  505 (9:10am)  506 (11:30am)

Quiz Grade: ________________

**Directions for taking quizzes:** You may not share calculators. Follow the Aggie Honor Code! Give calculator commands where appropriate.

1. (25 pts) Suppose that we are given the graph of the function \( f \). How must we transform the graph of \( f \) to obtain the graph of \( g \) if \( g(x) = -4f(x-6)+2 \)?

First transformation: Reflect across \( \mathcal{X} \)-axis

Second transformation: Vertical stretch by a factor of \( 4 \)

Third transformation: Circle one: Right or Left 6 units

Fourth transformation: Circle one: Up or Down 2 units

2. (25 pts) If \( f(x) = \frac{3}{x^2-2} \), and \( g(x) = \sqrt{x+6} \).

a. Fully simplify \( (f \circ g)(x) \).

\[
(f \circ g)(x) = f(g(x)) = f(\sqrt{x+6}) = \frac{3}{(\sqrt{x+6})^2 - 2} = \frac{3}{x+4}
\]

b. What is the domain in interval notation of \( (f \circ g)(x) \)?

\[x+6 \geq 0 \text{ and } x+4 \neq 0 \]
\[x \geq -6 \text{ and } x \neq -4 \]

Domain is \([-6, -4) \cup (-4, \infty)\)

b. Fully simplify \( (g \circ f)(1) \).

\[
(g \circ f)(1) = g(f(1)) = g\left(\frac{3}{1^2-2}\right) = g(-3) = \sqrt{-3+6} = \sqrt{3}
\]
3. (25 pts) In the year 3050 a unicorn population, \( P(t) \), is initially 48 and triples every year.

   a. How many unicorns are there after \( t \) years?

   \[
P(t) = 48 \times 3^t \quad \text{unicorns for } t \text{ years after 3050}
   \]

   b. How many unicorns are there after 10 years (unicorns live forever)?

   \[
P(10) = 2,834,352 \quad \text{unicorns}
   \]

   c. In how many years do you expect the unicorn population to reach 600,000,000?

   \[
   Y_1 = 48 \times 3^x \\
   Y_2 = 600,000,000
   \]

   \[
   \text{Unsolved} \\
   x \approx 14.87
   \]

   Between 14 to 15 years or in the year 3064, expect population to reach 600,000,000 unicorns.

NAME: ____________________________

MATH 150 SECTION (Circle one):

504 505 506

Circle First Letter of Last Name:

A-D E-K L-R S-Z