NAME: _____ Student id: _____

INSTRUCTIONS: No books, notes, calculators, etc. All answers must be simplified as much as possible. Write all answers in the spaces provided at the right. Do scratchwork on the back or on scratch paper provided. *No partial credit.* Time: 20 minutes.

1. Write as a single fraction, and simplify as much as possible: $\dfrac{3}{a-2} - \dfrac{1}{a-5}$

Answer: _____

2. Multiply out: $(a+1)(a^2 - 3a + 1)$.

Answer: _____

3. Let $f(x) = 5 - x$. Evaluate the expression $f(x+3) - f(3x)$, and simplify it as much as possible.

Answer: _____

4. Simplify the following expression as much as possible. If no simplification is possible, write "not possible": $\dfrac{6x^2 + 3}{6x^2 + 12}$

Answer: _____

5. Find all real solutions to the equation $\ln(5x + 6) = 5$. If no real solution exists, write "no solution".

Answer: _____

6. Find all real solutions to the equation $\dfrac{1}{9x^2} = 0$. If no real solution exists, write "no solution".

Answer: _____

7. Find all real solutions to the equation $\left(\dfrac{x}{3}\right)(x+2) = 1$. If no real solution exists, write "no solution".
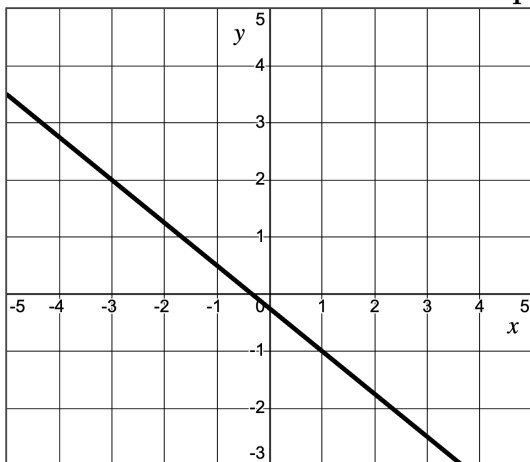
Answer: _____

8. Find the domain of the function $g(x) = \dfrac{1}{\sqrt{-x}}$.

Answer: _____

9. Simplify completely (for $y > 0$): $\left(\dfrac{2y^{3/2}}{\sqrt[3]{2}\,y}\right)^3$

Answer: _____

10. Determine the exact value of the **slope** of the line in the graph below.

Answer: _____