NAME: _____ Student id: _____

MATH 251 (PHILLIPS) MIDTERM ZERO (SAMPLE 2)

Turn in this version of the sample Midterm Zero as homework Tuesday 7 January 2025.

(1) **Unlike** the real version, show work in the space below the problem. It will be graded for partial credit.
(2) **Work must use fully correct notation, and correctly show what your steps were.** It must have "=" where it is supposed to be, and not where it is not supposed to be. See Section 6 of the online notation sheet. Also see the specific notation warnings on some problems here and on the other sample; these will **not** appear on the real Midterm Zero.
(3) All answers must be simplified as much as possible.

The real Midterm Zero will allow no books, notes, calculators, or other electronic devices, and will have no partial credit.

1. Find all real solutions to the equation $3\ln(5x+3)+2=14$. If no real solution exists, write "no solution".

2. Write as a single fraction, and simplify as much as possible: $\dfrac{1}{x+3}-\dfrac{1}{x-7}$

(See the reminder on fraction notation on the other sample, and Section 3 of the online notation sheet.)

3. Let $f(x)=1-x$. Evaluate the expression $f(2x-5)-f(x+3)$, and simplify it as much as possible.

4. Find all real numbers b such that $(-7,-b)$ is in the second quadrant (and not on any of the coordinate axes). (Notation reminder: Be sure to use the right variable!)

5. Find all real solutions to the equation $\dfrac{12}{z^2+4z}=1$. If no real solution exists, write "no solution". (Notation reminder: Be sure to use the right variable!)

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6. Multiply out: $(y-2)\big(y^2-7y+5\big)$.

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

8. Simplify completely (for $x \neq 0$): $\dfrac{\left(\frac{5}{3x^5}\right)}{\left(\frac{3}{5x}\right)}$

9. Find all real solutions to the equation $4\left(\dfrac{1}{x^2}+3\right)=12$. If no real solution exists, write "no solution".

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