

NAME: _____

Student id: _____

MATH 251 (PHILLIPS) MIDTERM ZERO (SAMPLE 1)

Turn in this version of the sample Midterm Zero as homework Tuesday 1 April 2025. As on the real version:

- (1) No partial credit. This means getting no credit even for minor mistakes, even notation, like using the wrong variable in an answer.
- (2) Fully correct notation is required. There are specific notation warnings on some problems; these will **not** appear on the real Midterm Zero.
- (3) Work is not required, and will not be graded.
- (4) All answers must be simplified as much as possible.
- (5) Write all answers in the spaces provided at the right.

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

Problems:

1. Write as a single fraction: $\frac{2}{x-1} - \frac{1}{x+2}$

Answer: _____

Notation reminder for Problem 1 (will **not** be repeated on the real Midterm Zero): to avoid ambiguity, all fraction lines must be exactly horizontal and cover the entire numerator and denominator, unless enough parentheses are used. Thus, for the problem $\frac{1}{x-17} - \frac{1}{x-1}$, the following answers use correct notation and will get full credit:

$$\frac{16}{(x-17)(x-1)} \quad \frac{16}{x^2-18x+17} \quad 16/[(x-17)(x-1)] \quad 16/(x^2-18x+17).$$

The following answers (crossed out in red in the online version of this file) will get **zero** credit because of notation errors:

$$\begin{array}{ccc} \cancel{16/x^2-18x+17} & \cancel{16/(x-17)(x-1)} & \cancel{16/x^2-18x+17} \\ \cancel{16/(x-17)(x-1)} & \cancel{16/x^2-18x+17} & \cancel{16/(x-17)(x-1)} \end{array}$$

For more, see Section 3 of the posted file on notation.

2. Simplify the following expression as much as possible. If no simplification is possible, write “not possible”: $\frac{4 \cos(4y)}{4 \cos(4y) + 6}$

Answer: _____

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

Answer: _____

4. Find all real solutions to the equation $1 + 3x^{-1} = 4x^{-2}$. If no real solution exists, write “no solution”.

Answer: _____

5. Find all real solutions to the equation $8(2 - x^{-3}) = 16$. If no real solution exists, write “no solution”.

Answer: _____

6. Multiply out: $(x + 2)(x^2 - x + 1)$.

Answer: _____

7. Find all real numbers a such that $|a| = -a$.

Answer: _____

Notation reminder for Problem 7 (will **not** be repeated on the real Midterm Zero): Use the correct variable! See Section 7 of the posted file on notation.

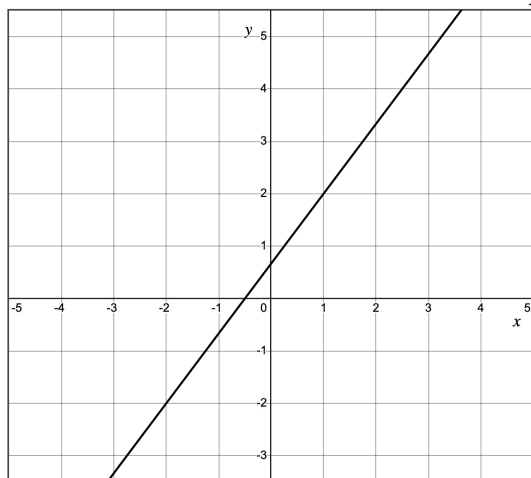
8. Suppose $g(x) = 2x^3 + 4x^2 - x$. Find the exact value of $g(-10)$.

Answer: _____

9. Assuming $x > 0$, write the expression $\frac{\sqrt[5]{x}}{5x^2}$ as a numerical constant (possibly a fraction) multiplied by a power of x .

Answer: _____

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



Answer: _____

Notation reminder for Problem 10 (will **not** be repeated on the real Midterm Zero): A decimal approximation which is not exact (such as something like 2.444 will get no credit. A fraction not in lowest terms is not simplified, and will get no credit. Mixed fractions are never allowed, and will get no credit. See Section 3 of the posted file on notation.