

MATH 150 - WEEK-IN-REVIEW 1

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PROBLEM STATEMENTS

1. Consider the function

$$h(x) = \begin{cases} -2x + 4 & , \text{ if } x \leq -1 \\ (x - 2)^2 & , \text{ if } x > -1. \end{cases}$$

Find $h(-2)$, $h(-1)$, and $h(2)$.

2. Find an equation of the line through the points $(3, 9)$ and $(-7, 1)$ in standard form.

3. Find an equation of the line through the points $(3, 9)$ and $(3, -2)$.

4. Find an equation of the line through the points $(3, 9)$ and $(-1, 9)$.

5. Write an equation of a line a) parallel to and b) perpendicular to the line $5 + x - 2y = 0$ and passing through the point $(4, -3)$ in slope-intercept form.

6. Solve the following inequalities. Graph their solution set.

(a) $\frac{x}{2} - \frac{3}{5} \leq \frac{1 - 2x}{10}$

(b) $-5 \leq \frac{1 - 4x}{2} < 7$

(c) $|3x - 1| < 11$

7. Simplify the following expression. Write your answer so that each variable appears at most once, and all exponents are positive.

$$\frac{15(xy^{-1})^2(x^{-2}y^2)^3}{5(x^{-1/2})^4(xy^{-3})^{-2}}$$

8. Simplify each radical expression.

(a) $\sqrt[3]{\frac{16x^4y^2z^4}{-27x^2y^5}}$

(b) $\sqrt{x^3} + \sqrt{4x^3} - \sqrt{8x}$

9. Rationalize the denominator.

(a) $\frac{5 - z}{\sqrt{5} + \sqrt{z}}$

(b) $\frac{5\sqrt{3} - 3\sqrt{2}}{2\sqrt{3} + 3\sqrt{2}}$

10. Simplify the following expression. Leave answer with rational exponents.

$$\left(\frac{a^{5/4} \cdot a^{-1/8}}{a^{1/4}} \right)^{8/3}$$

11. Factor each expression.

(a) $x^2y^2 - 10xy + 25$

(b) $4y^2 - 4y - 3$

(c) $(x + 2)(x^2 - 8) + (x + 2)^2(x - 1)$

12. Find the domain of each expression.

(a) $f(x) = x^2 - 10x + 18$

(b) $\frac{7x + 1}{9x^2 - 3}$

(c) $\frac{\sqrt{1 - 2x}}{x^2 - 5x}$

13. Perform the operations and simplify.

(a) $\frac{2x^2 - 5x - 3}{6x^2 + 3x} \cdot \frac{3x^2 + 12x - 15}{x^2 + 2x - 15}$

(b) $\frac{x^2 + 5x - 14}{x^2 + 8x + 7} \div \frac{x^2 - x - 2}{x - 3}$

(c) $\frac{x + 2}{x^2 - 2x - 8} - \frac{x - 2}{x^2 - 4}$

$$(d) \frac{\frac{1}{x} - \frac{1}{2x^2}}{\frac{2}{x} - 1}$$

14. Determine whether the function is even, odd, or neither. Then describe the symmetry.

$$(a) f(x) = \frac{x(x^2 - 1)}{5x^4 + 1}$$

$$(b) g(x) = \sqrt[3]{x^2 - 1}$$

$$(c) h(x) = \frac{x^3 - 1}{x^4 + 2}$$

15. If $h(x) = \frac{3x}{2} + 1$ evaluate the following:
- (a) $h(a)$

(b) $h(a + b)$

(c) $\frac{h(a + b) - h(a)}{b}$