

Math 150 Exam 1 Problems

Sections 1.1-1.10, 2.1-2.8

1. Simplify the expression and eliminate any negative exponents.

$$\left(\frac{xy^{-2}z^{-3}}{x^2y^3z^{-4}} \right)^{-3}$$

2. Factor each expression completely.

$$(a^2 - 1)b^2 - 4(a^2 - 1)$$

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

$$(a^2 + 2a)^2 - 2(a^2 + 2a) - 3$$

3. Perform the addition or subtraction and simplify. $\frac{1}{x+1} - \frac{2}{(x+1)^2} + \frac{3}{x^2-1}$

4. Simplify:
$$\frac{\left(a + \frac{1}{b}\right)^m \left(a - \frac{1}{b}\right)^n}{\left(b + \frac{1}{a}\right)^m \left(b - \frac{1}{a}\right)^n}$$

5. Simplify:
$$\frac{(x+h)^3 - 7(x+h) - (x^3 - 7x)}{h}$$

6. Simplify:
$$\frac{(7-3x)^{\frac{1}{2}} + \frac{3}{2}x(7-3x)^{-\frac{1}{2}}}{7-3x}$$

7. Rationalize the denominator: $\frac{h\sqrt{x}\sqrt{x+h}}{\sqrt{x}-\sqrt{x+h}}$

8. Solve the equation for a . $\frac{a+1}{b} = \frac{a-1}{b} + \frac{b+1}{a}$

9. Next-door neighbors Bob and Jim use hoses from both houses to fill Bob's swimming pool. They know it takes 18 hours using both hoses. They also know that Bob's hose, used alone, takes 20% less time than Jim's hose alone. How much time is required to fill the pool by each hose alone?

10. Solve. Express the solution using interval notation.

$$\frac{x}{2} \geq \frac{5}{x+1} + 4$$

11. Solve. Express the solution using interval notation.

$$7|x + 2| + 5 > 4$$

12. Are the points $A (-2, 9)$, $B (4, 6)$, $C (1, 0)$, and $D (-5, 3)$ the vertices of a square? Justify.

13. Find the solutions and draw a graph. State the answer correct to two decimal places.

$$(x+1)^2 < (x-1)^2$$

14. Find an equation of the perpendicular bisector of the line segment joining the points $A(1, 4)$ and $B(7, -2)$.

15. Find the domain of the function. $G(x) = \frac{3x^2}{\sqrt{x^2 - 2x - 8}}$

16. Sketch the graph. $f(x) = \begin{cases} x^2 & \text{if } |x| \leq 1 \\ 1 & \text{if } |x| > 1 \end{cases}$

17. Determine the average rate of change of the function between the given values of the variable.

$$g(x) = x^3 - 4x^2 \quad x = 0, x = 10$$

18. Sketch the graph of the function by transformations of the parent function.

$$y = \frac{1}{2}\sqrt{x+4} - 3$$

19. Find the maximum or minimum value of the function. $h(x) = -\frac{x^2}{3} + 2x + 7$

20. Find $(g \circ f)(x)$ and its domain when $f(x) = 3x - 5$ and $g(x) = 2 - x^2$.

21. Find the inverse function of $f(x) = \frac{x-2}{x+2}$. Is it 1-1?