

Directions: Show your work or explain your answer for the following problems. Answers without explanation may not receive any credit. You will be graded on everything you show. If you do not have room in a problem, please write the word "SCRAP" and complete the problem on scrap paper with your answer written on the test. If you use scrap paper, then please make sure that you have the problems labeled and done in an orderly fashion and turn your scrap paper in with your exam. Answers should be written in the form asked for or in so-called "simplified" form (e.g. where any operation you are able to have done was done, denominators are rationalized, exponents are positive, etc.)

1. Solve the quadratic equation by factoring: $x^2 - 10x + 9 = 0$.
2. Solve by any method: $x^2 + 3x = \frac{3}{4}$.
3. Write the expression with the quadratic portion as the sum or difference of two squares:
$$\frac{4}{x^2 + 10x + 89}$$
4. Perform the operations and write in standard form: $(4 - 3i)(2 - 4i)$.
5. Solve by any method: $x^2 + 0x + 9 = 0$.

6. Solve the equation: $32x^3 - 96x = 0$.
7. Solve the equation: $\sqrt{3x} - 15 = 0$.
8. Solve the inequality and write your answer in interval notation: $x^2 - 7x + 7 < 15$.
9. Consider the standard form for the equation of a line compared to the functional form. What type of lines are able to be represented by the standard form that are not able to be represented by the functional form? Explain.
10. Let m_1 and m_2 be the slopes of two lines. What is the relationship between m_1 and m_2 if . . .
- The lines are parallel.
 - The lines are perpendicular.

For #11-13, let $f(x) = x - 7$, $g(x) = x^2 - 4x + 4$, and $h(x) = \frac{1}{x-2}$ with domains implied.

11. Evaluate $f(-7)$, $f(x - 2)$, $g(2)$, $g(-3)$, $h(3)$.

12. Find the following functions: $(g - f)(x)$, $(fg)(x)$, $\left(\frac{f}{g}\right)(x)$, and $(gh)(x)$. State any restrictions on the domains of these functions.

13. Find the following functions: $(f \circ g)(x)$ and $(h \circ f)(x)$.

For #14-17, work is not required, but credit will not be awarded without it if the answer is incorrect.

14. Consider a parent function, $y = f(x)$ being shifted to the right by 3, what would be an equation for this new function?

15. Consider a parent function, $y = f(x)$ being shifted down by 2, what would be an equation for this new function?

16. Consider a parent function, $y = f(x)$ being stretched horizontally by a factor of 4, what would be an equation for this new function?

17. Consider a parent function, $y = f(x)$ being shrunk vertically by a factor of 2, what would be an equation for this new function?

18. Draw the graph of $y = x^2$ and the graph of $y = 3(x - 2)^2$ on the same set of axes. Include scales and any interesting points.

19. Find f^{-1} if $f(x) = \sqrt{x - 2}$. State any restrictions on the domain of f^{-1} .

20. Find f^{-1} if $f(x) = 3x + 4$.