

1. Graph each of the following functions.

a) $f(x) = |x|$ b) $f(x) = |x| - 4$ c) $f(x) = |x - 4|$

2. Suppose that $f(x)$ is a function given by $f(x) = -x^2 + 10x - 1$. Find the value of

a) $f(0)$ b) $f(3)$ c) $f(-3)$ d) $\frac{f(-3)}{f(3)}$ e) $f(-1)$

f) $f(5 - \sqrt{2})$ g) Find all values of x with $f(x) = 0$

3. Factor each of the following by completing the square or state if it does not factor.

a) $x^2 - 6x + 5$ c) $x^2 - 6x + 13$ e) $1560x^2 - 26598x + 78x^3$

b) $x^2 - 6x + 9$ d) $x^2 - 6x + 7$ f) $3x^2 - 14x - 5$

4. Simplify each of the following expressions.

a) $\frac{(-x^{-4})^{-2}x^3y^0(-yxy^{-2}x^{-2})^{-3}}{2x^2(-2x^{-4}y)^{-3}yx^0}$ g) $(7 - 3\sqrt{2})^2$

b) $\frac{x^2 - 5x}{x^2 - 2x - 15} \cdot \frac{x^2 - 9}{x^2 - 3x}$ h) $(6 - 5\sqrt{2})(6 + 5\sqrt{2})$

c) $\frac{3a^2xy^3 - 3b^2xy^3 + 3a^2x^2y^2 - 3b^2x^2y^2}{6ax^4y - 6bx^4y - 6ax^2y^3 + 6bx^2y^3}$ i) $\frac{2}{\sqrt{29} + 5}$

d) $\frac{1}{2 - \frac{1}{x - 4}}$ j) $\frac{4x - 9}{2\sqrt{x} - 3}$

e) $\frac{x^2 - 3x}{x^2 + 4x - 21} \cdot \frac{6x + x^2 - 7}{x^2 - x}$ k) $3\sqrt{8} + 2\sqrt{18} - \sqrt{50}$

f) $\frac{2ax - 3b - 3a + 2bx}{a^2 - b^2} \div \frac{2x^2 - x - 3}{3b - 3a + ax - bx}$ l) $\frac{-6 + \sqrt{24}}{10}$

5. Perform the operations on the complex numbers as indicated.

a) $|3 - 7i|$ c) $(5 - 2i)(5 + 2i)$ e) i^{99}

b) $(5 - 2i)^2$ d) $\frac{-48 + 25i}{-5 + 2i}$ f) $(1 - i)^4$

6. Find the exact value of $3x^2 - 5x + 18$ if $x = 3 - 4i$.

7. Solve the equation $x^2 - 14x + 53 = 0$ among the complex numbers. Check your solution(s).

8. Find $f(2 - \sqrt{7})$ if $f(x)$ is a function defined by $f(x) = 3x^2 - 12x - 3$.

9. Graph the functions $f(x) = 10x - x^2 - 16$ and $g(x) = 3x - 10$ in the same coordinate system. Find the coordinates of the point(s) where the graphs intersect.

10. Solve each of the following equations. Make sure to check your solutions.

a) $\frac{5x+1}{28} + \frac{12x-6}{56} = \frac{x-1}{14}$

e) $x^3 - 2x^2 - 35x = 0$

i) $4x + x^3 = 6x^2$

b) $x^3 = 12x^2 + 3213x$

f) $2x^2 - 32x = 0$

j) $3\left|\frac{1}{2}x - 5\right| + 1 = -8$

c) $3|x+3| - 5 = 10$

g) $x^2 + 11 = 8x$

k) $5 - (2-x)(x+3) = (x-2)^2$

d) $2(x-3) - \frac{x}{2} = \frac{3}{2}(x-4)$

h) $x^2 + 134 = 22x$

11. Solve each of the following inequalities. Graph the solution set.

a) $(2-3x)(x-5) \leq 4 - (x-3)(3x+2)$

b) $\frac{5-4x}{3} - \frac{2x-7}{5} > -2x+2$

12. Word Problems.

a) The difference between two integers is 26. Their product is 1767. Find these numbers.

b) How many gallons of 12% solution must be mixed with 6 gallons of 20% solution to obtain a solution that is 15%?

c) How many gallons of each of a 7% solution and a 27% solution should be mixed if we wanted to obtain 60 gallons of a 10% solution?

d) The population of a town has decreased from 75000 to 65250. What percent of a change does this represent?

e) The sum of five times a number and -10 is 8 less than six times the sum of 7 and the opposite of the number. Find this number.

f) We have invested \$8000 into two bank accounts: one earns 6% interest, the other one earns 9% interest. How much money did we invest into each account if the combined interest was \$660?

g) The hypotenuse of a right triangle is 26 cm. The difference between the other two sides is 14 cm. Find the missing sides.

h) Lisa took 5 exams. The first 4 received scores of 72, 93, 86, and 82. How much did she score on the fifth exam if her average score is 74 points?