



List the x - and y -intercepts and test for symmetry.

9. $x^2 - 9y^2 = 9$

10. How much water must be evaporated from 64 ounces of a 2% salt solution to make a 10% salt solution?

11. A function g is defined by $g(x) = \frac{A}{x} + \frac{8}{x^2}$

If $g(-1) = 0$, find A .

In problem 12, find the following for each function.

(a) $f(-x)$ (b) $-f(x)$ (c) $f(x+2)$ (d) $f(x-2)$

12. $f(x) = \frac{x^2}{x+2}$

In problem 13, determine (algebraically) whether the function is even, odd or neither.

13. $g(x) = \frac{4+x^2}{1+x^4}$

In problem 14, find the domain of each function.

14. $f(x) = \frac{3x^2}{x-2}$

15. Given: $f(x) = 1 - 3x^2$ and $g(x) = \sqrt{4-x}$, find:

(a) $(f \circ g)(2)$ (b) $(g \circ f)(-2)$



In problems 10 to 12, use Descartes' Rule of Signs and the Rational Zeros Theorem to find all real zeros, then use the zeros to factor over the real numbers.

10. $f(x) = x^3 - x^2 - 10x - 8$

11. $f(x) = 4x^3 - 4x^2 - 7x - 2$

12. $f(x) = x^4 + 6x^3 + 11x^2 + 12x + 18$

Write each expression in problems 13 to 15 in the form $a + bi$.

13. $(8 - 3i) + (-6 + 2i)$

14. $\frac{4}{2-i}$

15. $(3 - 2i)^3$



In problems 12 and 13, find the exact value of each expression. Do not use a calculator.

$$12. \quad 4 \csc \frac{3\pi}{4} - \cot \frac{-\pi}{4}$$

$$13. \quad \frac{1}{\cos^2 40^\circ} - \frac{1}{\cot^2 40^\circ}$$

In problem 14, find the exact value of each of the remaining trigonometric functions.

$$14. \quad \tan A = \frac{-2}{3}, \quad 90^\circ < A < 180^\circ$$

$$15. \quad \text{Graph } y = 3 \cos x + 3$$

10. Find the x- and y-intercepts of $f(x) = \frac{4-x}{x}$, then determine whether the graph of f touches or crosses the x-axis at the x-intercept.
11. Solve $3x^4 + 3x^3 - 17x^2 + x - 6 = 0$
12. Write $2(1 + i) - 3(2 - 3i)$ in the form $a + bi$.
13. $F(x) = \sqrt{x-2}$ is one-to-one; find its inverse. Find the domain and range of f and f^{-1} .
14. Write $\log(x^2 - 9) - \log(x^2 + 7x + 12)$ as a single logarithm.
15. Find y as a function of x ; the constant C is a positive number. $\ln(y - 1) + \ln(y + 1) = -x + C$
16. Solve $2^{x+1}(8^{-x}) = 4$
17. Convert 15° to radians.
18. Convert $\frac{2\pi}{3}$ to degrees.
19. Find the exact value of $\cos\frac{\pi}{3} + \sin\frac{\pi}{3}$. Do not use a calculator.
20. Find the exact value of the remaining trigonometric functions if $\cos A = \frac{-3}{5}$ and $\sin A < 0$.



In problems 10 to 12, find the remaining angle(s) and side(s) of each triangle if it (they) exists. If no triangle exists, say, "No triangle".

10. $\alpha = 10^\circ$, $\gamma = 40^\circ$, side $c = 2$.

11. Side $a = 10$, side $b = 7$, side $c = 8$.

12. Side $a = 1$, side $b = 2$, $\gamma = 60^\circ$.

In problems 13 and 14, find the area of each triangle.

13. Side $b = 5$, side $c = 4$, $\alpha = 20^\circ$

14. Side $a = 3$, side $b = 2$ and side $c = 2$.

15. Find the height of a building that is 80 feet away from a point on the ground, when this point on the ground makes an angle of 25° with the top of the building.



In problem 7, the vector v is represented by the directed line segment PQ . Write v in the form $ai + bj$ or in the form $v = a + bj + ck$, and find $\|v\|$.

7. $P = (-3, 1); Q = (4, -2)$

In problems 8 to 10, identify each equation. If it is a parabola, give its vertex, focus, and directrix; if it is an ellipse, give its center, vertices, and foci; if it is a hyperbola, give its center, vertices, foci, and asymptotes.

8. $16x^2 = y$

9. $\frac{x^2}{9} + \frac{y^2}{16} = 1$

10. $\frac{y^2}{25} - x^2 = 1$

In problem 11, solve the system of equations using substitution or elimination. If the system has no solution, say that it is inconsistent.

11. $x - 3y + 5 = 0$
 $2x + 3y - 5 = 0$

In problem 12, find the inverse of the matrix (if there is one) algebraically. If there is not an inverse, say that the matrix is singular.

12. $\begin{vmatrix} 3 & 1 & 2 \\ 3 & 2 & -1 \\ 1 & 1 & 1 \end{vmatrix}$

13. Solve the following system using matrices. If the system has no solution, say that it is inconsistent.

$$\begin{aligned} 2x + y + z &= 5 \\ 4x - y - 3z &= 1 \\ 8x + y - z &= 5 \end{aligned}$$

14. Find the determinant of $\begin{vmatrix} -4 & 0 \\ 1 & 3 \end{vmatrix}$

15. Use Cramer's Rule, if applicable, to solve:

$$\begin{aligned} x - 3y &= -5 \\ 2x + 3y &= 5 \end{aligned}$$



Find the indicated term in each sequence.

9. 8th term of 1, -1, -3, -5, ...

10. 11th term of 1, 2, 4, 8, ...

Find a general formula for each arithmetic sequence.

11. 8th term is -20; 17th term is -47

12. 12th term is 30; 22nd term is 50



10. Write $3 - 2i$ in polar form.
11. Write $4 \left[\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4} \right]$ in the standard form $a + bi$.

12. Find zw and $\frac{z}{w}$. Leave your answers in polar form.

$$z = 4(\cos 50^\circ + i \sin 50^\circ)$$

$$w = \cos 340^\circ + i \sin 340^\circ$$

13. Write $(2 - 2i)^8$ in the standard form $a + bi$.
14. Write v in the form $ai + bj$ or in the form $v = ai + bj + ck$, and find $\|v\|$.
 $P = (4, 7, 0)$; $Q = (0, 5, 6)$
15. Identify $3y^2 - x^2 = 9$. If it is a parabola, give its vertex, focus and directrix. If it is an ellipse, give its center, vertices, and foci. If it is a hyperbola, give its center, vertices, foci and asymptotes.
16. Solve the following system of equations using elimination or substitution:
- $$\begin{aligned} 2x - y &= -1 \\ x + \frac{1}{2}y &= \frac{3}{2} \end{aligned}$$
17. Find the inverse of $\begin{vmatrix} -3 & 1 \\ -6 & 2 \end{vmatrix}$

