

1. Find the real solutions to each:

(a) $2x = 8 - x^2$

(b) $3x = 8 - x^2$

(c) $\frac{3}{x} - \frac{3}{x+2} = 2$

(d) $\frac{x^2 - 2x}{x^2 + 3x + 1} = 0$

(e) $x + \sqrt{x} - 6 = 0$

(f) $\ln x - \ln 3 = 2$

(g) $e^{3t} = 100$

(h) $\log_2 t + \log_2(t+1) = 1$

(i) $2 \cos x - \sqrt{2} = 0, 0 \leq x \leq 2\pi$

2. Determine the exact coordinates of the point(s) where the following line(s) and curve(s) intersect.

(a) $3x + 4y = 5$ and $x - 2y = -6$

(b) $y = 8 - x^2$ and $y = 7$

3. Find the equations of the line:

(a) through $(2, 7)$ and $(-5, 1)$

(b) parallel to $3x + 4y = 5$ and through $(2, 7)$

4. Solve the following inequalities and write the solution using interval notation.

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

(b) $-3 \leq 1 - 2x < 4$

5. Express $\frac{1}{u} - \frac{3}{v}$ as a single fraction.

6. Express $\frac{\sin \theta}{1 + \cos \theta} + \frac{\cos \theta}{\sin \theta}$ as a trigonometric function.

7. Evaluate

(a) $\left(\frac{8x^{12}y^{-3}}{y^6z^3}\right)^{-\frac{4}{3}}$

(b) $\tan\left(\frac{\pi}{3}\right)$

(c) $\sin^{-1}\left(-\frac{1}{2}\right)$

8. Let $f(x) = 2x^2 - 2x$

(a) Compute $f(x + h)$

(b) Simplify $\frac{f(x + h) - f(x)}{h}$

9. A 10 foot ladder is leaning against a wall. Let x be the distance along the floor from the wall to one end of the ladder, and let y be the distance along the wall from the floor to the top of ladder, where it touches the wall. Write an equation expressing y in terms of x .

10. The cost C of building a highway through a certain section of the country is proportional to its length L . A two and one half mile section costs \$1,000,000.

(a) Express the cost C as a function of length L

(b) Compute the cost of building 15 miles of highway.