

In Calculus you will see the symbol  $y'$ . For exercises 1 – 4, treat  $y'$  as a variable and solve the equation for  $y'$ .

1.  $\frac{2x}{25} + \frac{2y}{9} y' = 0$

2.  $2xy^3 + 3x^2 y^2 y' - y' = 1$

3.  $3y^2 y' + 6xy + 3x^2 y' = 2y^2 + 4xyy'$

4.  $3(x+y)^2 + 3(x+y)^2 y' - 3y^2 y' = 3x^2$

For Exercises 5 – 7, simplify the expression. Do not rationalize the denominator.

5.  $2x\sqrt{2x-3} + x^2 \left( \frac{1}{2} \right) \frac{1}{\sqrt{2x-3}} (2)$

6. 
$$\frac{2x(2x-7)^{1/2} - x^2 \left( \frac{1}{2} \right) (2x-7)^{-1/2} (2)}{\left[ (2x-7)^{1/2} \right]^2}$$

7. 
$$\frac{(1)(x^2-9)^{1/2} - x \left( \frac{1}{2} \right) (x^2-9)^{-1/2} (2x)}{\left[ (x^2-9)^{1/2} \right]^2}$$

For exercises 8 – 10,

- Simplify the expression. Do not rationalize the denominator.
- Find the values of  $x$  for which the expression equals zero.
- Find the values of  $x$  for which the denominator is zero.

8. 
$$\frac{4x(4x-5)-2x^2(4)}{(4x-5)^2}$$

9. 
$$\frac{-6x(6x+1)-(-3x^2)(6)}{(6x+1)^2}$$

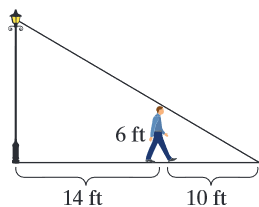
10. 
$$\sqrt{4-x^2} + x\left(\frac{1}{2}\right)\frac{1}{\sqrt{4-x^2}}(2x)$$

Some applications of calculus use a mathematical structure called a power series. To find the interval of convergence of a power series, it is often necessary to solve an absolute value inequality. For exercises 11 – 12, solve the absolute value inequality to find the interval of convergence.

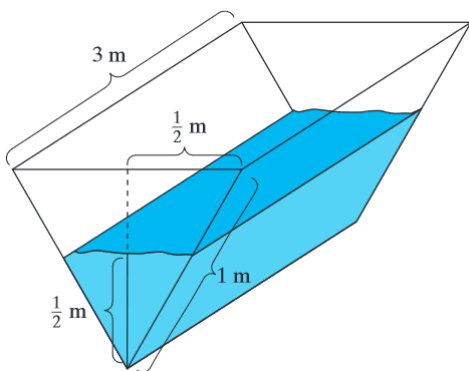
11. 
$$\left|\frac{x+1}{2}\right| < 1$$

12. 
$$\left|-\frac{x}{2}\right| < 1$$

13. A 6-ft man walks away from a lamppost. At the instant the man is 14 ft away from the lamppost, the shadow is 10 ft. Find the height of the lamppost.



14. A water trough has a cross section in the shape of an equilateral triangle with sides of length 1 m. The length is 3 m. Determine the volume of water when the water level is  $\frac{1}{2}$  m.



15. A contractor builds a swimming pool with cross section in the shape of a trapezoid. The deep end is 8 ft deep and the shallow end is 3 ft deep. The length of the pool is 50 ft and the width is 20 ft. As the pool is being filled, find the volume of water when the depth is 4 ft.

