

# Exercises and Problems for Section 9.1

## Exercises

Are the functions in Exercises 1–6 power functions? If so, write the function in the form  $f(x) = kx^p$ .

1.  $g(x) = \frac{(-x^3)^3}{6}$

2.  $R(t) = \frac{4}{\sqrt{16t}}$

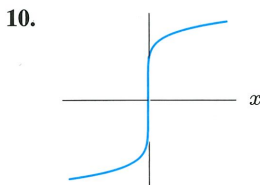
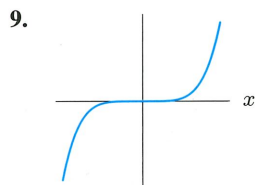
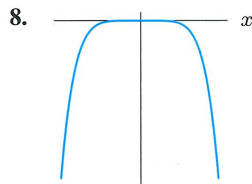
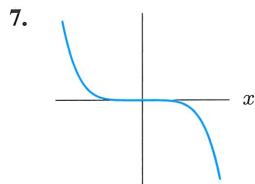
3.  $Q(t) = \left(\frac{1}{2\sqrt{t}}\right)^3$

4.  $K(w) = \frac{w^4}{4\sqrt{w^3}}$

5.  $T(s) = (6s^{-2})(es^{-3})$

6.  $h(x) = 22(7^x)^2$

Do the power functions in Exercises 7–10 appear to have odd, even, or fractional powers?



In Exercises 11–13, find a power function through the two points.

11. (7, 8) (1, 0.7)    12. (1, 5) (3, 27)    13. (6, 17) (1, 2)

14. Find a possible formula for the power function  $f(t)$  given that  $f(3) = 5$  and  $f(5) = 3$ .

15. Suppose  $y$  is directly proportional to  $x$ . If  $y = 6$  when  $x = 4$ , find the constant of proportionality and write the formula for  $y$  as a function of  $x$ . Use your formula to find  $x$  when  $y = 8$ .

16. Suppose  $y$  is inversely proportional to  $x$ . If  $y = 6$  when  $x = 4$ , find the constant of proportionality and write the formula for  $y$  as a function of  $x$ . Use your formula to find  $x$  when  $y = 8$ .

17. Suppose  $c$  is directly proportional to the square of  $d$ . If  $c = 45$  when  $d = 3$ , find the constant of proportionality and write the formula for  $c$  as a function of  $d$ . Use your formula to find  $c$  when  $d = 5$ .

18. Suppose  $c$  is inversely proportional to the square of  $d$ . If  $c = 45$  when  $d = 3$ , find the constant of proportionality and write the formula for  $c$  as a function of  $d$ . Use your formula to find  $c$  when  $d = 5$ .

In Exercises 19–22, find possible formulas for the power functions.

19.

$x$	0	1	2	3
$j(x)$	0	2	16	54

20.

$x$	2	3	4	5
$f(x)$	12	27	48	75

21.

$x$	-6	-2	3	4
$g(x)$	36	4/3	-9/2	-32/3

22.

$x$	-2	-1/2	1/4	4
$h(x)$	-1/2	-8	-32	-1/8

23. Find (a)  $\lim_{x \rightarrow \infty} x^{-4}$     (b)  $\lim_{x \rightarrow -\infty} 2x^{-1}$

24. Find (a)  $\lim_{t \rightarrow \infty} (t^{-3} + 2)$     (b)  $\lim_{y \rightarrow -\infty} (5 - 7y^{-2})$

## Problems

25. Compare the graphs of  $y = x^{-2}$ ,  $y = x^{-4}$ , and  $y = x^{-6}$ . Describe the similarities and differences.

26. Describe the behavior of  $y = x^{-10}$  and  $y = -x^{10}$  as  
 (a)  $x \rightarrow 0$     (b)  $x \rightarrow \infty$     (c)  $x \rightarrow -\infty$

27. Describe the behavior of  $y = x^{-3}$  and  $y = x^{1/3}$  as  
 (a)  $x \rightarrow 0$  from the right    (b)  $x \rightarrow \infty$

28. If  $f(x) = kx^p$ ,  $p$  an integer, show that  $f$  is an even function if  $p$  is even, and an odd function if  $p$  is odd.