EXAMPLE 4 Graphing Power Functions $f(x) = k \cdot x^a$

State the values of the constants k and a. Describe the portion of the curve that lies in Quadrant I or IV. Determine whether f is even, odd, or undefined for $x < 0$. Describe the rest of the curve if any. Graph the function to see whether it matches the description.

(a) $f(x) = 2x^{-3}$ **(b)** $f(x) = -0.4x^{1.5}$ **(c)** $f(x) = -x^{0.4}$

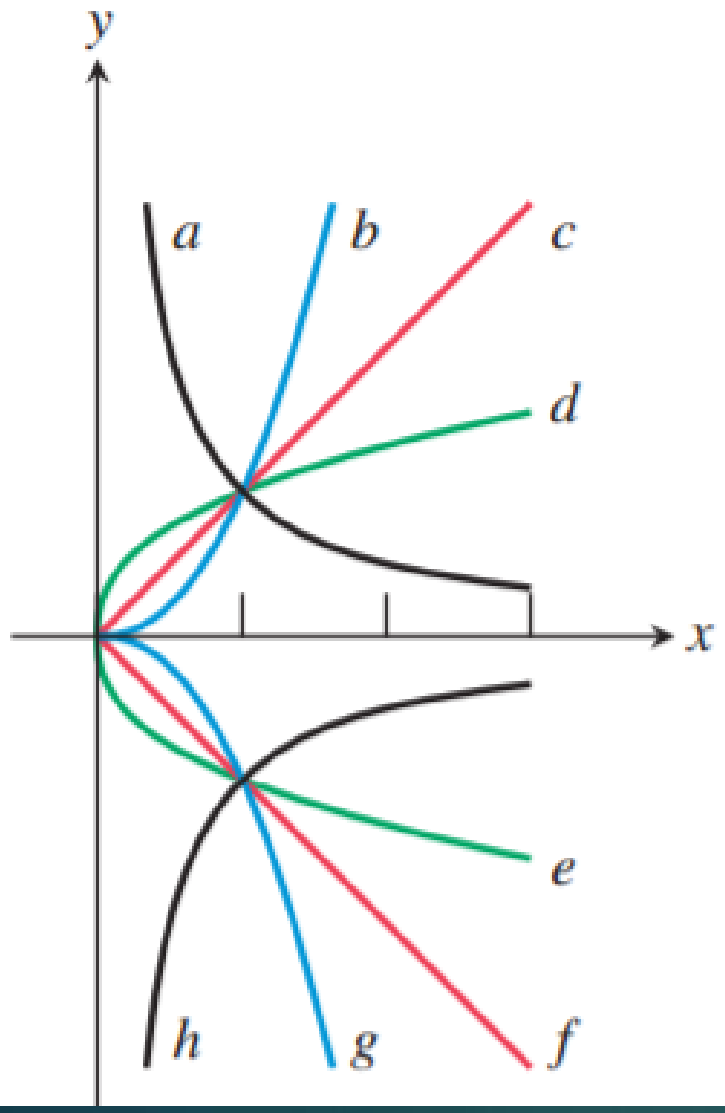
EXAMPLE 6 Modeling Free-Fall Speed versus Distance

Use the data in Table 2.11 to obtain a power function model for speed p versus distance traveled d. Then use the model to predict the speed of the ball at impact given that impact occurs when $d \approx 1.80$ m.

Table 2.11 Rubber Ball Data from CBR™ Experiment

Distance (m)	Speed (m/s)
0.00000	0.00000
0.04298	0.82372
0.16119	1.71163
0.35148	2.45860
0.59394	3.05209
0.89187	3.74200
1.25557	4.49558

In Exercises 37–42, match the equation to one of the curves labeled in the figure.



37. $f(x) = -\frac{2}{3}x^4$

38. $f(x) = \frac{1}{2}x^{-5}$

39. $f(x) = 2x^{1/4}$

40. $f(x) = -x^{5/3}$

41. $f(x) = -2x^{-2}$

42. $f(x) = 1.7x^{2/3}$

In Exercises 43–48, state the values of the constants k and a for the function $f(x) = k \cdot x^a$. Describe the portion of the curve that lies in Quadrant I or IV. Determine whether f is even, odd, or undefined for $x < 0$. Describe the rest of the curve if any. Graph the function to see whether it matches the description.

43. $f(x) = 3x^{1/4}$

44. $f(x) = -4x^{2/3}$

45. $f(x) = -2x^{4/3}$

46. $f(x) = \frac{2}{5}x^{5/2}$

47. $f(x) = \frac{1}{2}x^{-3}$

48. $f(x) = -x^{-4}$

57. Light Intensity Velma and Reggie gathered the data in Table 2.13 using a 100-watt light bulb and a Calculator-Based Laboratory™ (CBL™) with a light-intensity probe.

(a) Draw a scatter plot of the data in Table 2.13

(b) Find the power regression model. Is the power close to the theoretical value of $a = -2$?

(c) Superimpose the regression curve on the scatter plot.

(d) Use the regression model to predict the light intensity at distances of 1.7m and 3.4 m.

Table 2.13 Light Intensity Data for a 100-W Light Bulb

Distance (m)	Intensity (W/m^2)
1.0	7.95
1.5	3.53
2.0	2.01
2.5	1.27
3.0	0.90