2-1 Power and Radical Functions

Common Core State Standards: A-SSE.2, A-REI.1, A-REI.2, A-REI.10, F-IF.5, F-IF.7b,

Objectives:

- Graph and analyze power functions and radical functions.
- Solve radical equations.

I.   Power Functions: any function of the form $f(x) = ax^n$.

1. What are the end behaviors if n is even?   If n is odd?

2. If n is even, will there be any global max/global mins?   Why?   What if n is odd?

1.

Graph and analyze each function.
Describe the domain, range,
intercepts, end behavior,
continuity, and where the
function is increasing or
decreasing.

a. $f(x) = \dfrac{1}{2} x^6$

b. $f(x) = -x^5$

2.

Graph and analyze each function. Describe the domain, range, intercepts, end behavior, continuity, and where the function is increasing or decreasing.

a. $f(x) = 2x^{-4}$

b. $f(x) = 2x^{-3}$

c. $f(x) = x^{\frac{5}{4}}$

d. $f(x) = 4x^{-\frac{2}{5}}$

3.

ANIMALS The following data represent the body length L in centimeters and the mass M in kilograms of several African Golden cats being studied by a scientist.

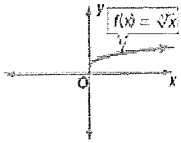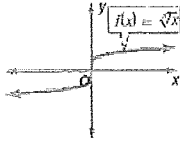| L	72	72	73	74	75	76	78	79
M	11	12	13	15	15	14	15	15
L	80	83	84	85	86	88	89	90
M	14	16	16	15	17	17	18	18

a. Create a scatter plot of the data.

b. Determine a power function to model the data.

c. Use the data to predict
the mass of an African
Golden cat with a length of
77 centimeters.

II. Radical Functions: an expression with rational exponents can also be written in radical form.

KeyConcept Radical Functions

Let f be the radical function $f(x) = \sqrt[n]{x}$ where n is a positive integer.

n Even

$f(x) = \sqrt[n]{x}$

Domain and Range: $(0, \infty)$
x- and *y*-intercept: 0
Continuity: continuous on $(0, \infty)$
Symmetry: none   Increasing: $(0, \infty)$
Extrema: absolute minimum at $(0, 0)$
End Behavior: $\lim\limits_{x \to \infty} f(x) = \infty$

n Odd

$f(x) = \sqrt[n]{x}$

Domain and Range: $(-\infty, \infty)$
x- and *y*-intercept: 0
Continuity: continuous on $(-\infty, \infty)$
Symmetry: origin   Increasing: $(-\infty, \infty)$
Extrema: none
End Behavior: $\lim\limits_{x \to -\infty} f(x) = -\infty$ and
$\lim\limits_{x \to \infty} f(x) = \infty$

4.

Graph and analyze each function.
Describe the domain, range,
intercepts, end behavior,
continuity, and where the
function is increasing or
decreasing.

a. $f(x) = 5\sqrt{2x^3}$

b. $f(x) = \frac{1}{2}\sqrt[5]{3x - 4}$

III. *Solving Radical Equations: Watch out for extraneous solutions!*

Solve each equations.

5. $2x = \sqrt{28x + 29} - 3$

6. $12 = \sqrt[3]{(x-2)^2} + 8$

7. $\sqrt{x+1} = 1 + \sqrt{2x-12}$