

## 3.2 Power Functions

### Supplementary Notes

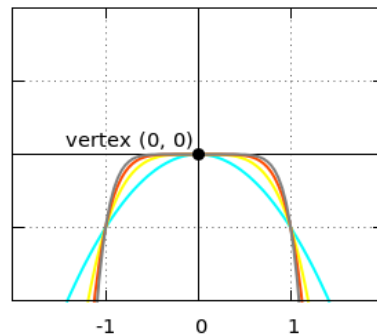
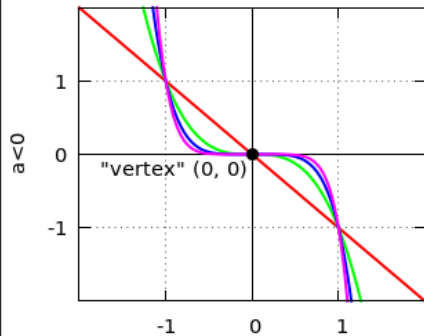
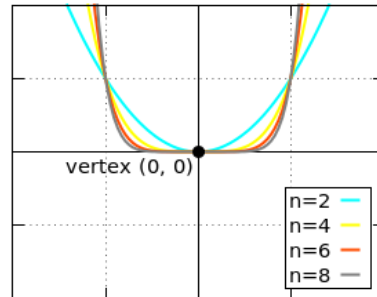
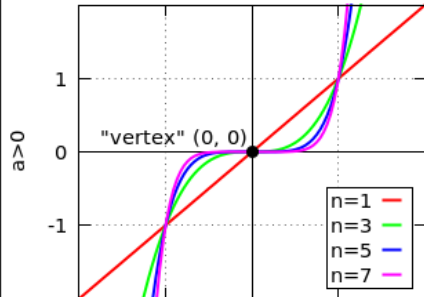
$$f(x) = ax^n \quad (a \neq 0)$$

#### End Behavior

		$n$ odd	$n$ even
$a > 0$	As $x \rightarrow \infty$	$f(x) \rightarrow \infty$	$f(x) \rightarrow \infty$
	As $x \rightarrow -\infty$	$f(x) \rightarrow -\infty$	$f(x) \rightarrow \infty$
$a < 0$	As $x \rightarrow \infty$	$f(x) \rightarrow -\infty$	$f(x) \rightarrow -\infty$
	As $x \rightarrow -\infty$	$f(x) \rightarrow \infty$	$f(x) \rightarrow -\infty$

$n$  odd

$n$  even



#### Reflection

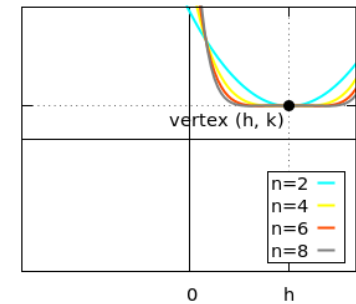
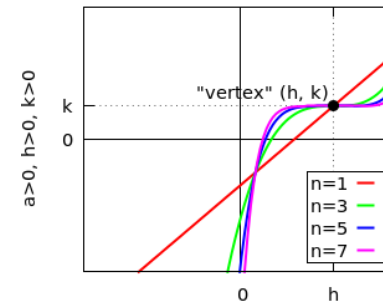
To obtain the graph of

$-f(x)$	reflect the graph of $f(x)$ about the $x$ -axis
$f(-x)$	reflect the graph of $f(x)$ about the $y$ -axis

$$f(x) = a(x - h)^n + k \quad (a \neq 0)$$

$n$  odd

$n$  even



#### Translation

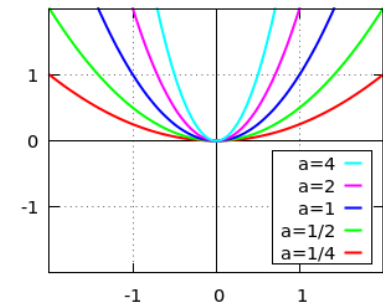
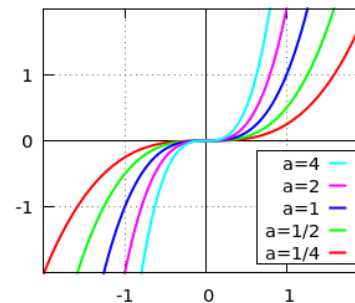
For  $h, k > 0$ , to obtain the graph of

$f(x) + k$	translate the graph of $f(x)$	upward $k$ units
$f(x) - k$	translate the graph of $f(x)$	downward $k$ units
$f(x - h)$	translate the graph of $f(x)$	rightward $h$ units
$f(x + h)$	translate the graph of $f(x)$	leftward $h$ units

$$f(x) = ax^n \quad (a \neq 0)$$

$n$  odd

$n$  even



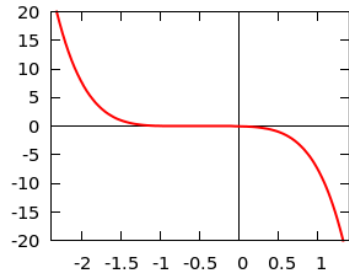
#### Expansion/Contraction

For  $a > 1$ , to obtain the graph of

$af(x)$	expand the graph of $f(x)$	vertically by a factor of $a$
$\frac{1}{a}f(x)$	contract the graph of $f(x)$	vertically by a factor of $a$
$f(\frac{1}{a}x)$	expand the graph of $f(x)$	horizontally by a factor of $a$
$f(ax)$	contract the graph of $f(x)$	horizontally by a factor of $a$

## Exercises

1. Select the equation of the following graph



- A.  $y = -(x - \frac{1}{2})^6$   
B.  $y = (x - \frac{1}{2})^6$   
C.  $y = (x + \frac{1}{2})^5$   
D.  $y = -(x + \frac{1}{2})^5$

2. Select the graph of  $y = (x - 1)^6$

