

C**COMBINED POWER FUNCTIONS**

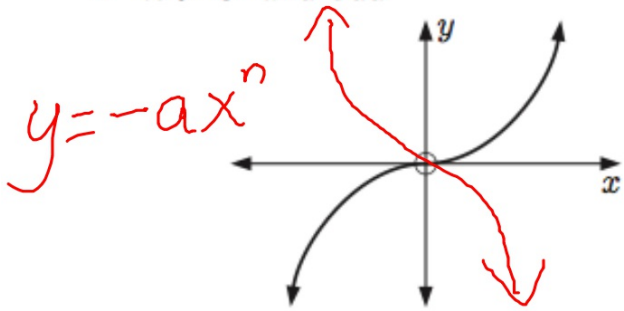
A **power function** is a function of the form $y = kx^n$ where $k \neq 0$ and n is a non-zero rational number.

Trade your graphs with the person next to you. How are their four graphs different?

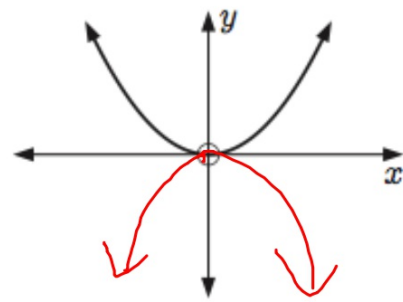
How do they compare to your four graphs?

In summary: functions of the form $y = x^n$, $n \in \mathbb{Z}$:

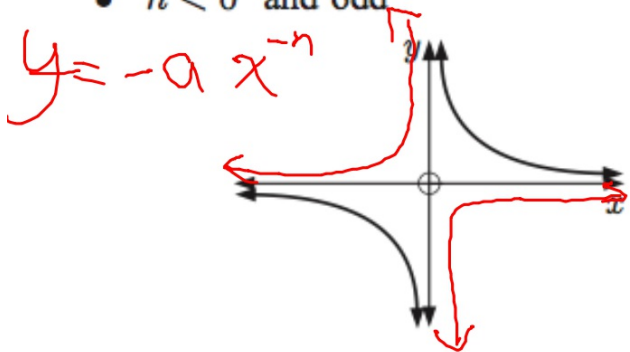
- $n > 0$ and odd



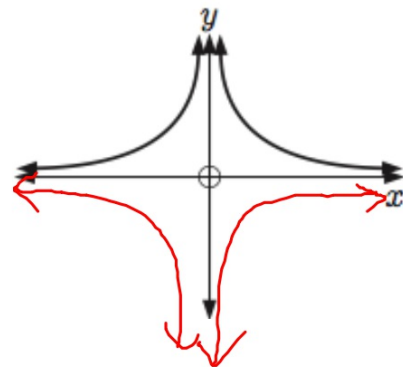
- $n > 0$ and even



- $n < 0$ and odd



- $n < 0$ and even



Now let's ADD two functions and consider the resulting graph.

In your calculator, graph $y = x$ and $y = 1/x$.

Now everyone in odd numbered seats delete those graphs and graph $y = x + (1/x)$.

Consider the function $f(x) = x^2 + \frac{1}{x}$.

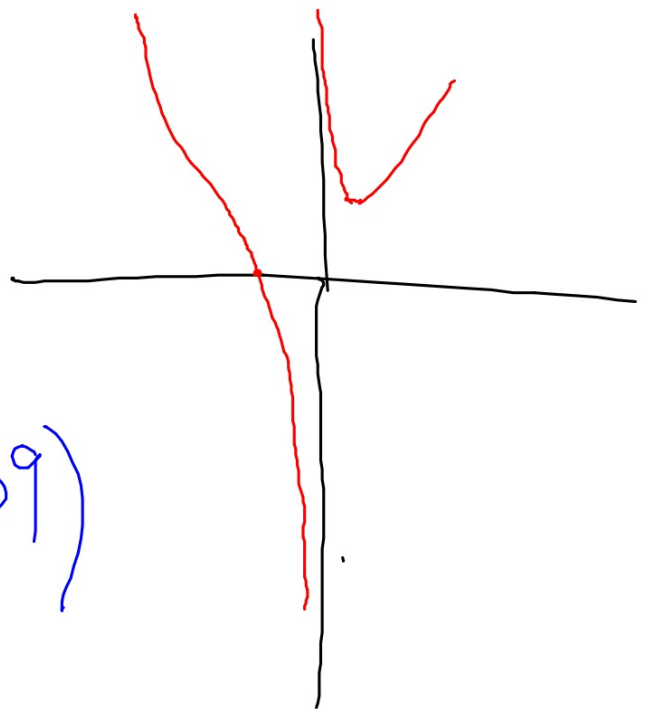
- a Find any vertical asymptotes of the function.
- b Find the axes intercepts.
- c Find the turning points.
- d Sketch the function.

$$f(x) = x^2 + \frac{1}{x}$$

a) $x = 0$

b) no y-int
x-int = $(-1, 0)$

c) Min $(0.794, 1.89)$



For each of the functions below:

- i** find any vertical asymptotes
- ii** determine the axes intercepts
- iii** determine the position of any turning points
- iv** sketch the graph of $y = f(x)$, clearly showing the features you have found.

$$f(x) = x^2 + 4x + \frac{1}{x^3}$$

Exercise 19 C # 1a-d, 2, 3

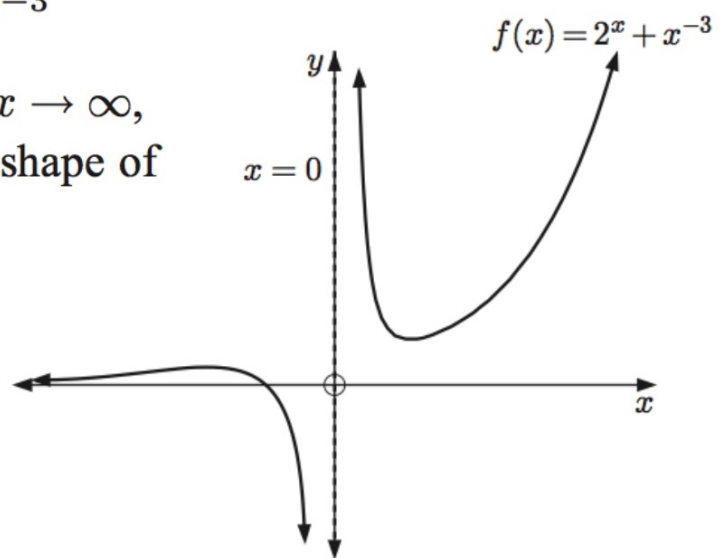
D**COMBINED FUNCTIONS**

When we combine exponential functions, the resulting graphs have some of the same features as the individual graphs.

For example:

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

- since $y = x^{-3}$ has the vertical asymptote $x = 0$, so does $f(x) = 2^x + x^{-3}$
- as $x \rightarrow \infty$, $x^{-3} \rightarrow 0$, so as $x \rightarrow \infty$, $f(x) = 2^x + x^{-3}$ takes on the shape of $y = 2^x$.



Consider the function $y = x^3 + 3^{-x}$.

- a Find the axes intercepts.
- b Find the position and nature of any turning points.
- c Sketch the graph of the function.

$$x \text{ int} = (-2.48, 0) \text{ and } (-3, 0)$$
$$y \text{ int} = (0, 1)$$

$$\text{local min. : } (-2.77, -0.283)$$
$$(0.468, 0.701)$$

$$\text{local max. : } (-1.12, 2.02)$$

