

$$29) f(x) = \frac{1}{2} \sqrt[4]{x}$$

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

$$K = \frac{1}{2}$$

$K > 0$ QI

$$a = \frac{1}{4} \quad 0 < a < 1 \quad \downarrow$$

Point $(1, 0.5)$



$x \geq 0$

$D: [0, \infty)$

$R: [0, \infty)$

2.2 Power Functions (Day 2)

We know how to handle a power function graph when

$x \geq 0$
 x is nonnegative, what about when $x < 0$? ~~QII~~
~~QIII~~

f(x) is even

$$f(-x) = f(x)$$

symmetric
y-axis

f(x) is odd

$$f(-x) = -f(x)$$

symmetric
origin

f(x) is undefined

no y values
exist


$$\sqrt{-1} = i$$

Lets Try Some

$$a) f(x) = \frac{2}{5}x^{-2} = \frac{2}{5x^2} \leftarrow \text{VA } x=0$$

$$K = \frac{2}{5} \Rightarrow K > 0$$

QI

$$a = -2 \Rightarrow a < 0$$


point $(1, \frac{2}{5})$

Is there symmetry?

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

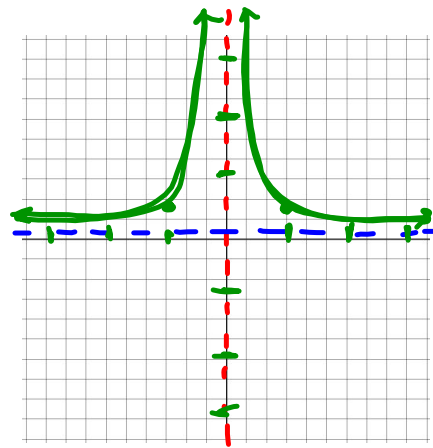
$$f(-x) = \frac{2}{5}(-x)^{-2}$$

$$= \frac{2}{5(-x)^2}$$

$$= \frac{2}{5x^2}$$

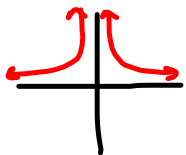
$$= \frac{2}{5}x^{-2} = f(x) \text{ even}$$

symmetric
y-axis



Is there
a HA?
yes
 $y=0$

VA
 $x=0$



$$D: (-\infty, 0) \cup (0, \infty)$$

$$R: (0, \infty)$$

Continuous? No (asymptote)

Bounded? Bounded Below ($y=0$)

Even/Odd: Even

Extrema? NO

End Behavior: $\lim_{x \rightarrow -\infty} f(x) = 0$

$$\lim_{x \rightarrow \infty} f(x) = 0$$

Lets Try Some More

b) $f(x) = -3x^{2.5}$

$k = -3 \Rightarrow \frac{k < 0}{QIV}$

$a = 2.5 \quad 2\frac{1}{2} = \frac{5}{2} \quad \begin{matrix} a > 1 \\ \downarrow \end{matrix}$

point (1, -3)

Is there symmetry?

$f(-x) = -3(-x)^{5/2}$

$-3\sqrt{(-x)^5}$

$-3\sqrt{-1 \cdot x^5}$

When $x < 0$, its undefined b/c $\sqrt{-1}$

D: $[0, \infty)$

R: $(-\infty, 0]$

Continuous? yes

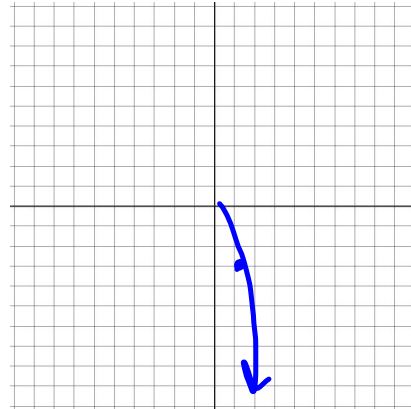
Bounded? bounded by $-3\sqrt{0^5}$

Extrema Max (0,0)

End Behavior

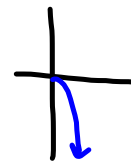
$\lim_{x \rightarrow -\infty} f(x)$ stops at 0

$\lim_{x \rightarrow \infty} f(x) = -\infty$



$x^{1/2}$ ← power
← index

$\sqrt[2]{x^1}$



Finish Ex 4 Graphs

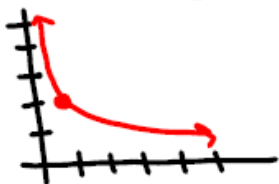
$$f(x) = 2x^{-3}$$

$$k = 2$$

$k > 0 \therefore \text{Q I}$

$$a = -3 \quad a < 1$$

passes through $(1, 2)$



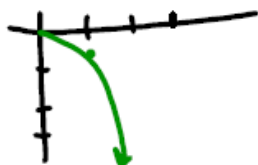
$$f(x) = -0.4x^{1.5}$$

$$k = -0.4$$

$k < 0 \therefore \text{Q IV}$

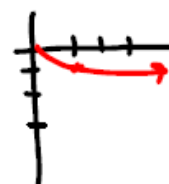
$$a = 1.5 \quad a > 1$$

pass through $(1, -0.4)$



$$f(x) = -x^{0.4}$$

$(1, -1)$



Hints for Rational Powers

