Radical Functions

Standard 5a: Use sign patterns to determine the domain of a rational function

Find the domain of $y = \sqrt{16x - x^3}$

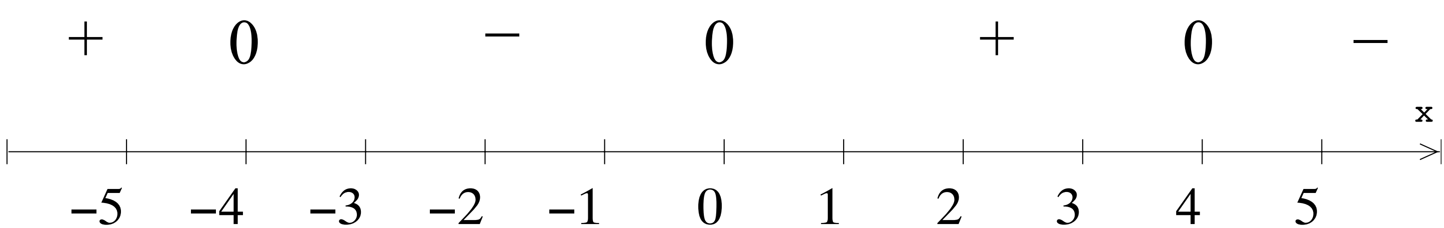
$$16x - x^3 \geq 0$$

What values of x give us something with a real number square root?

$$x(16 - x^2) \geq 0$$

$$x(4 - x)(4 + x) \geq 0$$

Now make a sign pattern number line

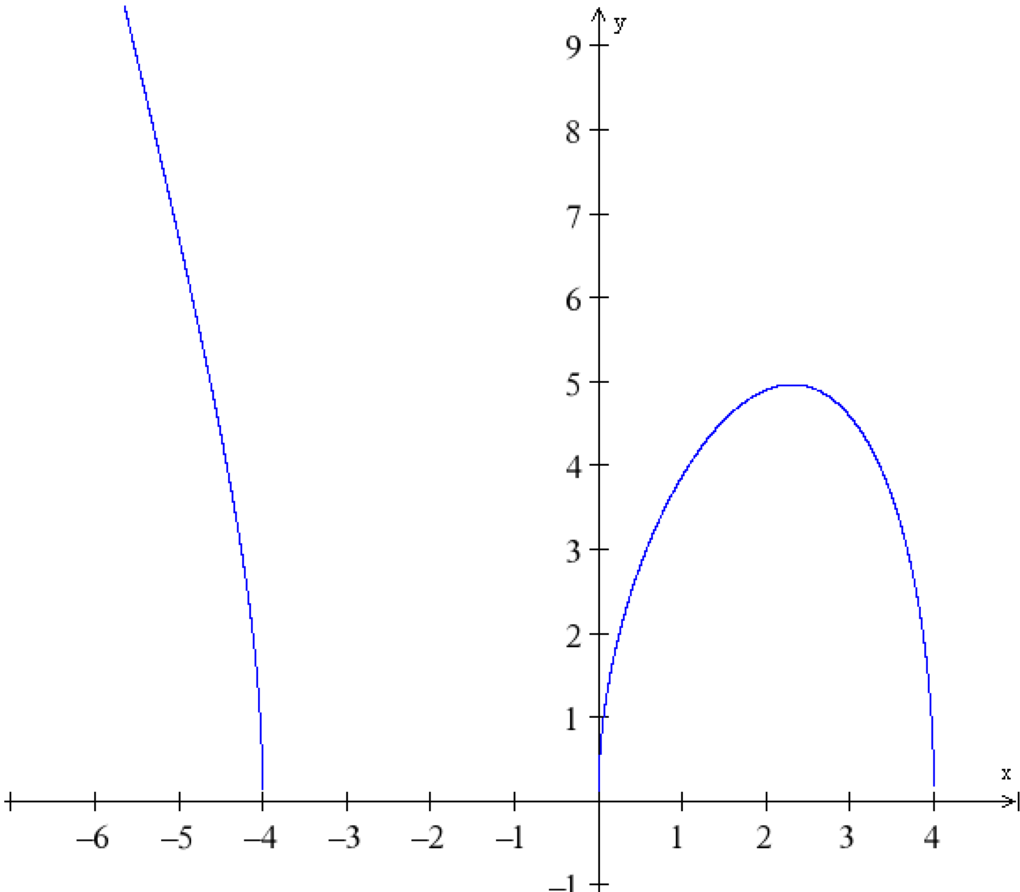


$x \leq -4$

$0 \leq x \leq 4$

Find the domain of $y = \sqrt{16x - x^3}$

What does this tell us about how the graph will look?



$x \le -4$

$0 \le x \le 4$

Note the intervals of x for which this graph exists.

$x \le -4$

$0 \le x \le 4$

Find the domain of $y = \sqrt{\dfrac{16x - x^3}{x-1}}$

What values of x give us something with a real number square root?

$$\frac{16x - x^3}{x-1} \geq 0$$

We already know from the previous example that

$$16x - x^3 \geq 0$$

when

$$x \leq -4$$

$$0 \leq x \leq 4$$

But we also have to account for values of x for which

$$x - 1 > 0$$

Remember that we can't include $x = 1$ because the denominator can't be zero

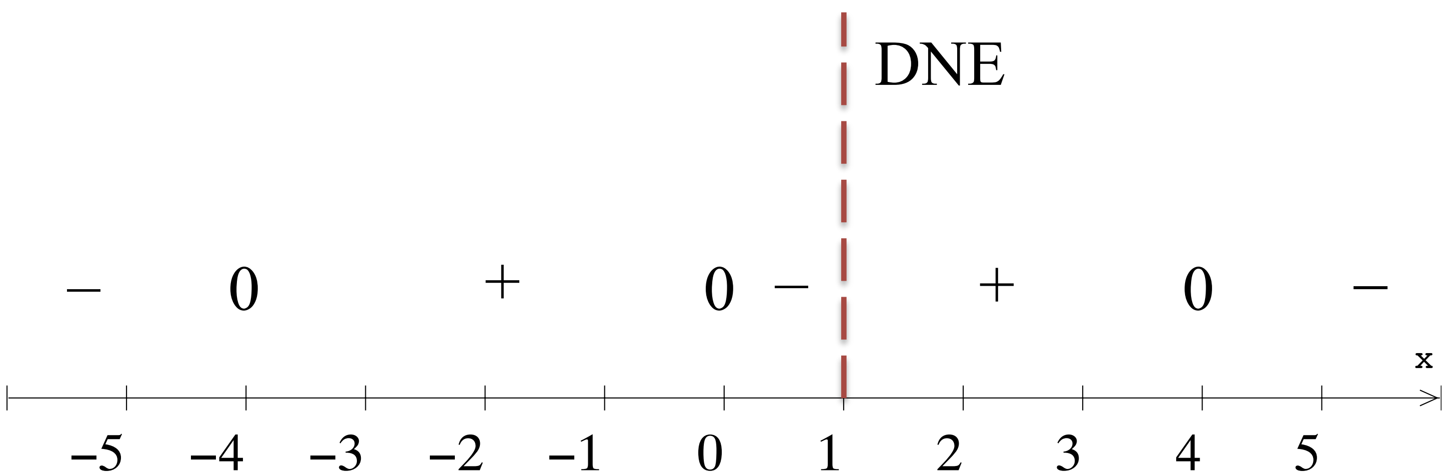
Find the domain of $y=\sqrt{\dfrac{16x-x^3}{x-1}}$

What values of x give us something with a real number square root?

$$\frac{16x-x^3}{x-1}\geq 0$$

$16x-x^3\geq 0$ when $x\leq -4$, $0\leq x\leq 4$

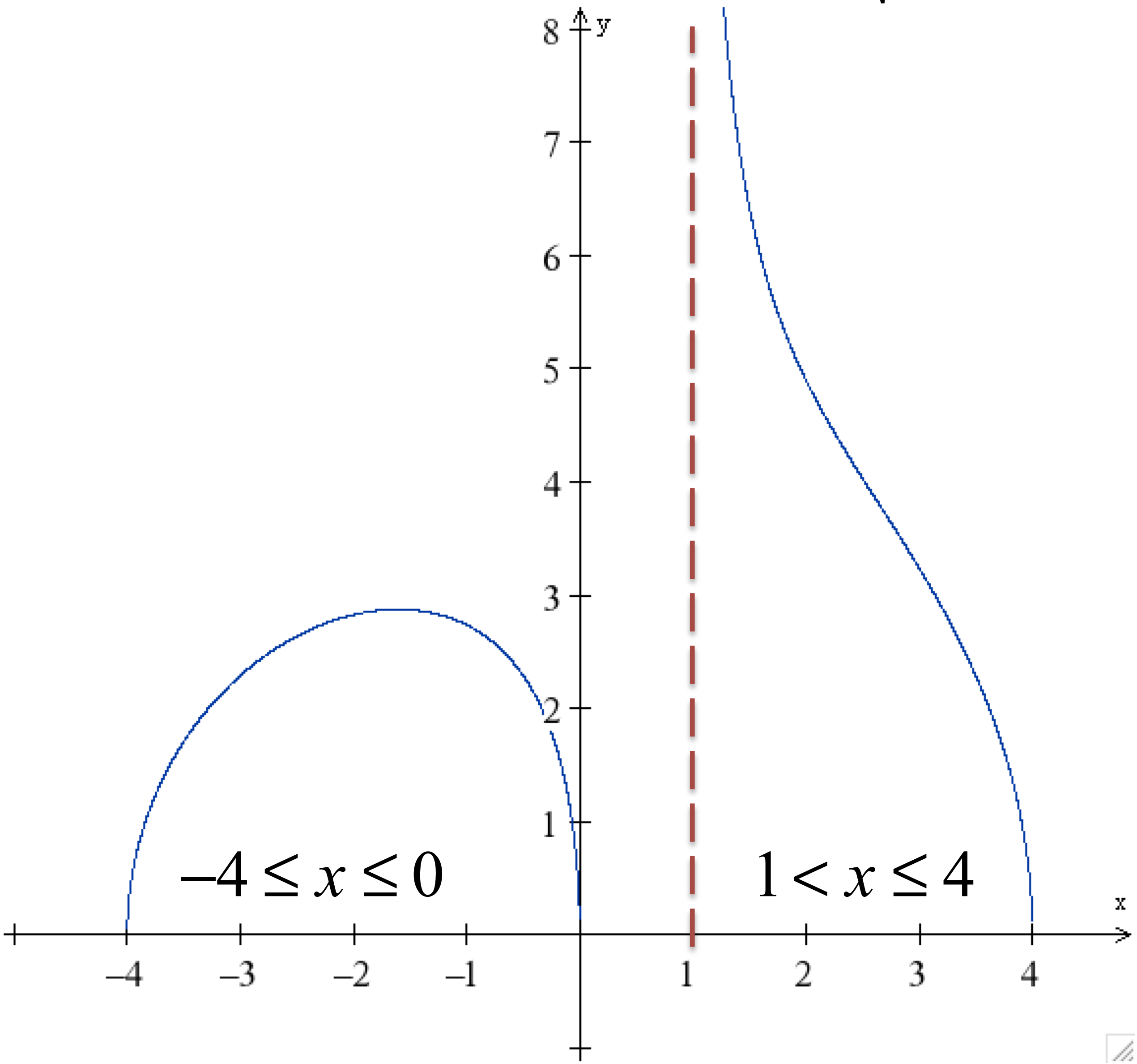
$x-1>0$ when $x>1$



$-4\leq x\leq 0$

$1<x\leq 4$

Find the domain of $y = \sqrt{\dfrac{16x - x^3}{x - 1}}$



$-4 \le x \le 0$

$1 < x \le 4$