

Tuesday, January 15

Split-domain function:

function — a relation for which
 (any set of
 ordered pairs)

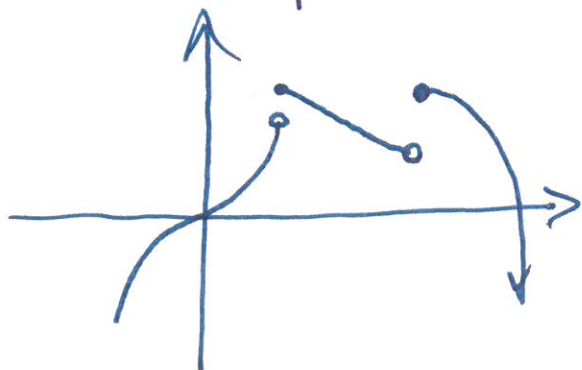
each 1st-element is assigned
 a UNIQUE 2nd-element.

ex: $(1.5, 11.44) \in (1.5, 7.44)$

$(7, 10.21) \in (7, 11.44)$

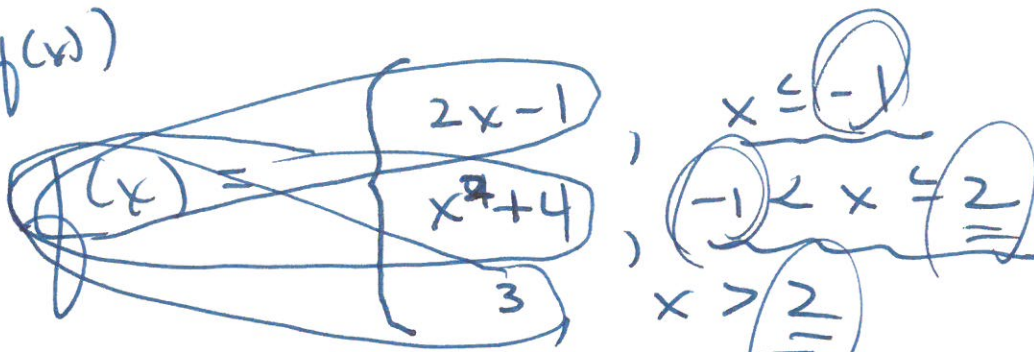
$(1743285, 2^{19}) (1743285, 11^{29})$

Split-domain function:
 (piecewise)



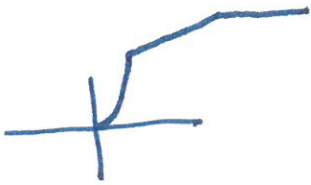
$(x, f(x))$

2



$y = 2x - 1$

x	y
-1	-3 ✓
-2	-5
-3	-7

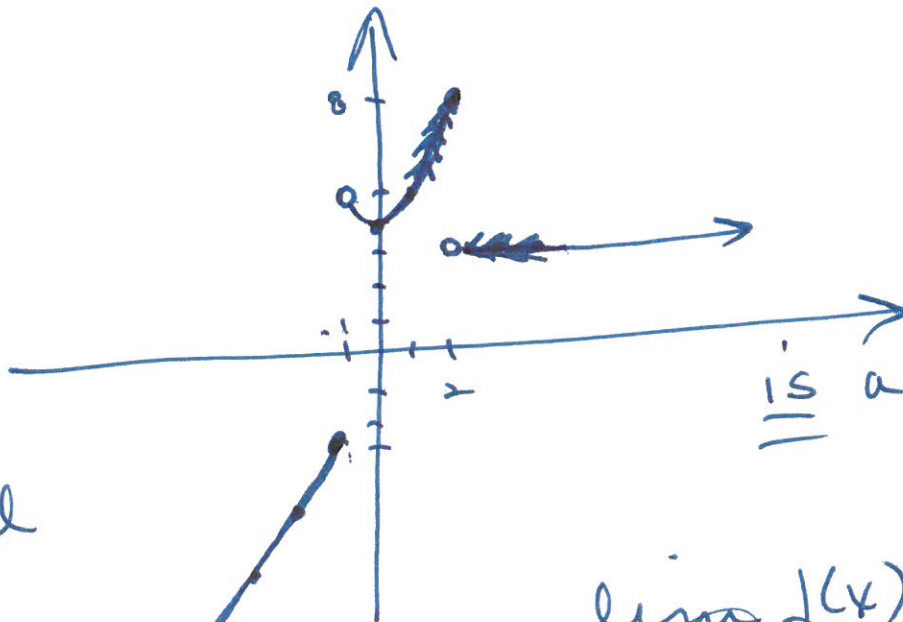


$y = x^2 + 4$

x	y
-1	5 DELETE
0	4
1	5
2	8

$y = 3$

x	y
2	3 DELETE
3	3
4	3



is a function

2-sided limits

1-sided limits

$\lim_{x \rightarrow 2^-} f(x) = 8$

"from the left"

$\lim_{x \rightarrow 2^+} f(x) = 3$

"from the right"

rational exponents

$$8^{-2/3} = \frac{1}{8^{2/3}} = \frac{1}{\left[\sqrt[3]{8}\right]^2} = \frac{1}{4}$$
$$= \frac{1}{\sqrt[3]{8^2}} \quad \uparrow$$

$$4^0 = 1$$

$$4^3 = 4 \cdot 4 \cdot 4$$

$$4^2 = 4 \cdot 4$$

$$4^1 = 4$$

$$\left(\frac{4^3}{4^3}\right) = \frac{4^{3-3}}{1} = 4^0 = 1$$

$$0^0 = ??$$

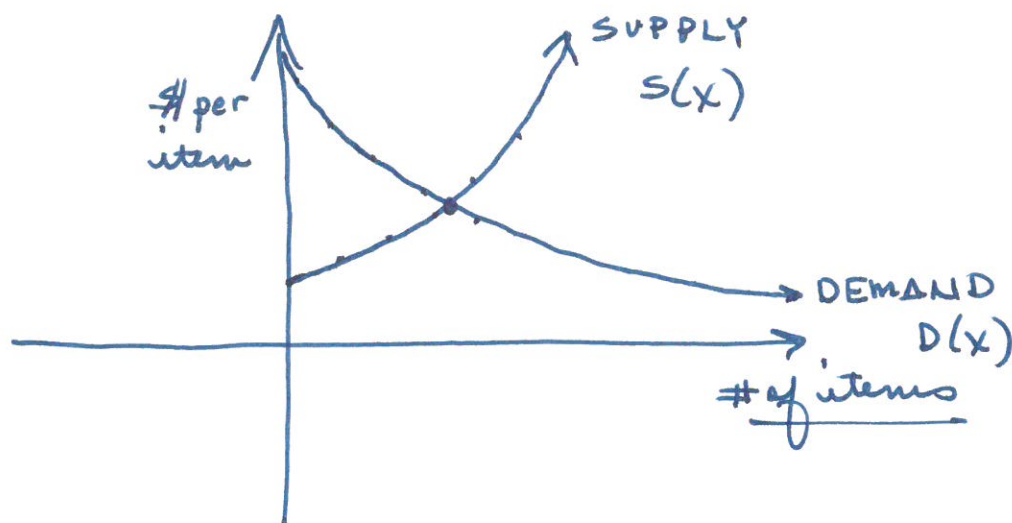
$$\frac{0^3}{0^3}$$

$$\frac{8}{4} = 2 \quad (2 \cdot 4 \stackrel{?}{=} 8)$$

$$\frac{0}{5} = 0 \quad (0 \cdot 5 \stackrel{?}{=} 0)$$

$$\left\{ \frac{4}{0} = \infty \right. \quad (x \cdot 0 \stackrel{?}{=} 4) \quad \underline{\text{no}} \text{ solution} \quad \#$$

$$\# \left\{ \frac{0}{0} = -1743 \right. \quad (17 \cdot 0 \stackrel{?}{=} 0) \text{ inf } \# \text{ of solutions}$$



supply & demand functions

$S(x)$ = $D(x)$ solve for x

- EQUILIBRIUM POINT

R3: DOMAIN & RANGE

$f(x) = 2x^2 + 3x + 5$ ✓

domain: $\mathbb{R}$

range: ~~~~~

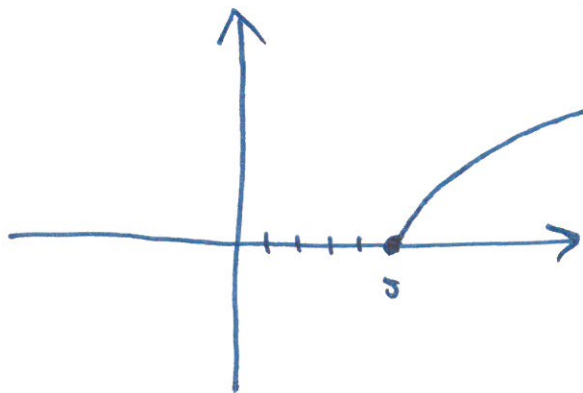


$g(x) = \sqrt{x-5}$ domain: $[5, \infty)$

$x - 5 \geq 0$

$x \geq 5$

range: $y \geq 0$ $[0, \infty)$

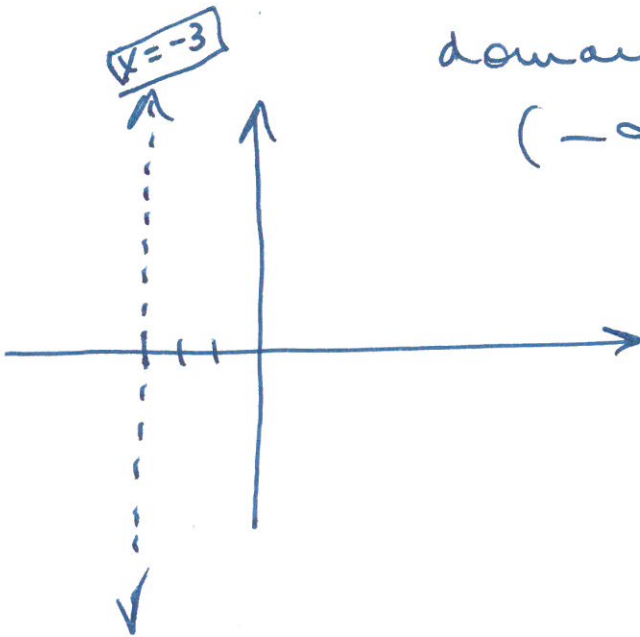


$$h(x) = \frac{2}{\underline{x+3}}$$

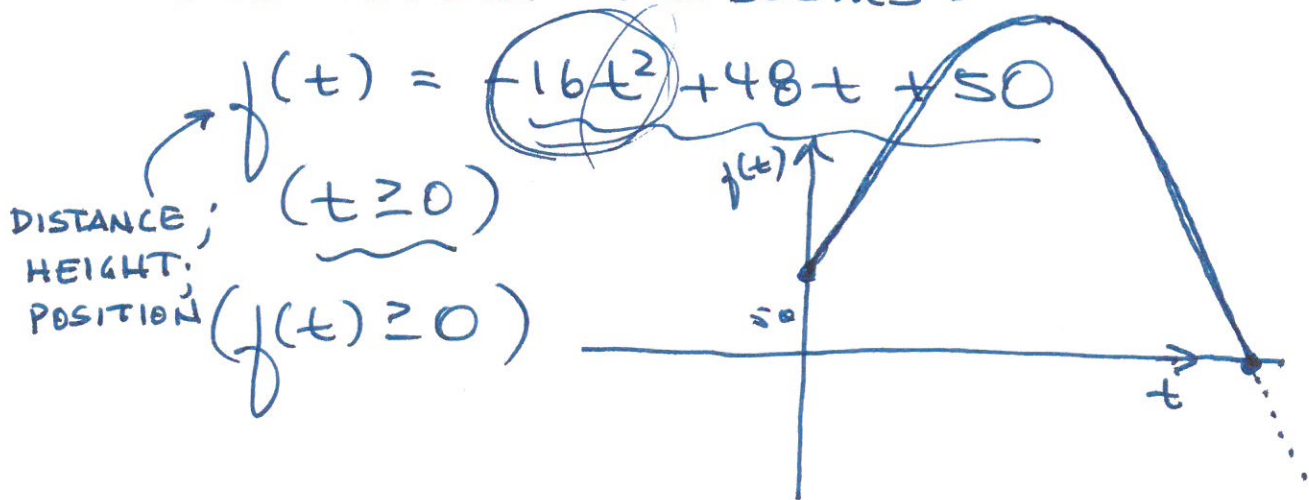
VERTICAL
ASYMPTOTE

domain: $x \neq -3$

$$(-\infty, -3) \cup (-3, \infty)$$



REAL-WORLD PROBLEMS:



VELOCITY: VEL = +
VEL = 0
VEL = -

ACCELERATION: ACCEL: +, 0, -

RS:

quadratic functions (2^{nd} degree)

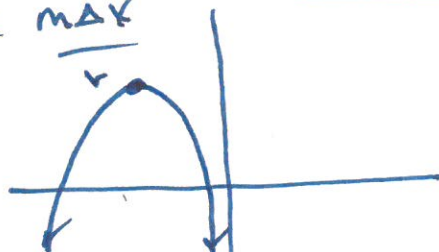
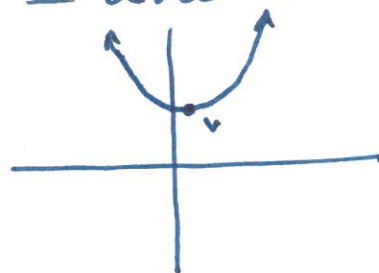
$$y = ax^2 + bx + c \quad (a \neq 0)$$

Parabola

sign of a : up $\approx$ down

VERTEX:

MIN $\approx$ MAX



$$V\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$$

ex:

$$f(x) = 3x^2 - 4x - 2$$

$V\left(\frac{2}{3}, -\frac{10}{3}\right)$

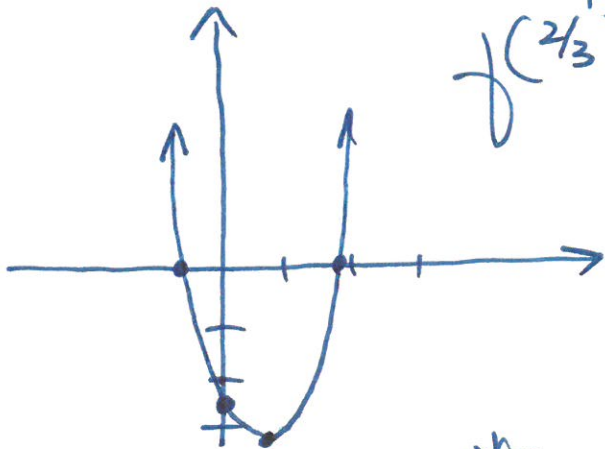
$$\begin{aligned} \frac{-b}{2a} &= \frac{4}{6} \\ &= \frac{2}{3} \end{aligned}$$

$$f\left(\frac{2}{3}\right) = 3\left(\frac{2}{3}\right)^2 - 4\left(\frac{2}{3}\right) - 2$$

$$= 3\left(\frac{4}{9}\right) - \frac{8}{3} - 2$$

$$= \frac{12}{9} - \frac{8}{3} - 2 = \frac{4}{3} - \frac{8}{3} - 2$$

$$= -\frac{4}{3} - \frac{6}{3} = -\frac{10}{3}$$



② Y-INT: ($x=0$)
(0, -2)

* INTERCEPTS: ① X-INT: ($y=0$)
 $x = \frac{4 \pm \sqrt{(-4)^2 - 4(3)(-2)}}{2(3)} = 0 = 3x^2 - 4x - 2$

The Alma Mater of NC State

Where the winds of Dixie softly blow o'er the fields of Caroline,
There stands ever cherished, N.C. State, as thy honored shrine
So lift your voices! Loudly sing from hill to oceanside!
Our hearts ever hold you, N.C. State in the folds of our love
and pride

Words by Alvin Fountain : Class of '22

Music by Bonnie Norris: Class of '23

Compliments of the Union Activities Board

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