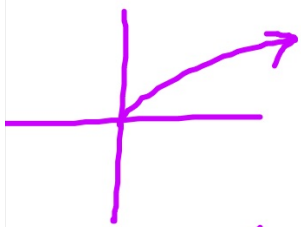
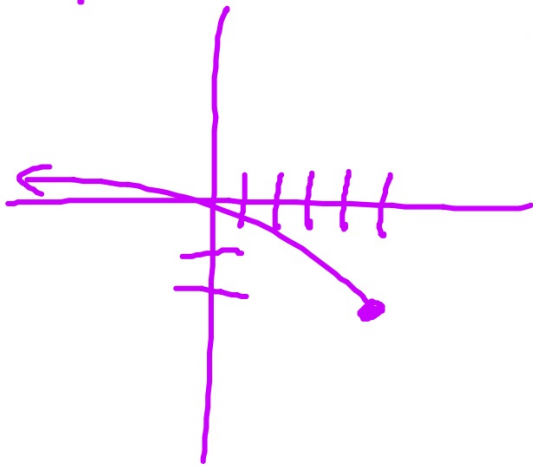


$$10.) f(x) = \sqrt{5-x} - 2$$



$$= \sqrt{-(x-5)} - 2$$

reflect y-axis      right 5      down 2

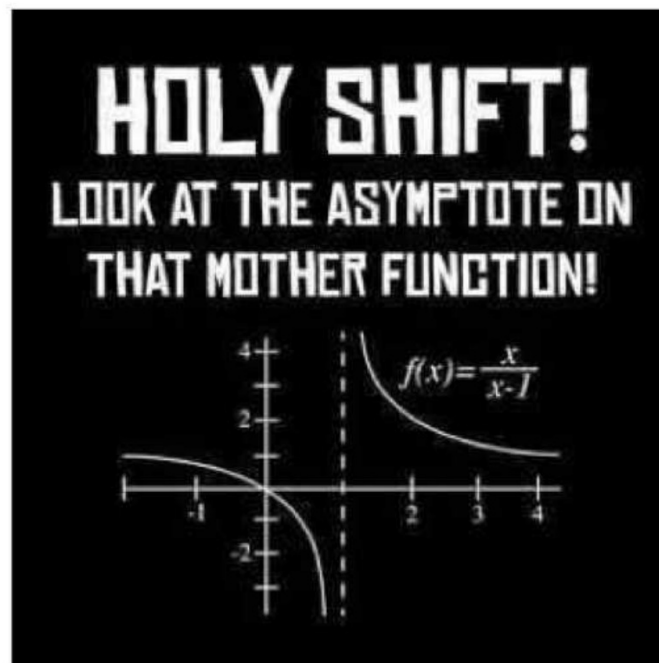


x	y
4	-1
1	0

$$D: (-\infty, 5]$$

$$R: [-2, \infty)$$

## Library of Functions & Transformations - Day 2



HW:

## Sketching Graphs with Asymptotes

- Reciprocal
- Reciprocal of a Square
- Exponential Growth/Decay
  - Natural Logarithm

### Process

1. Find the asymptote(s).
2. Plot the key point. (if possible)
3. Make a table of values.

ex: Sketch and state the D/R.

a)  $y = \frac{2}{x+3} + 4$

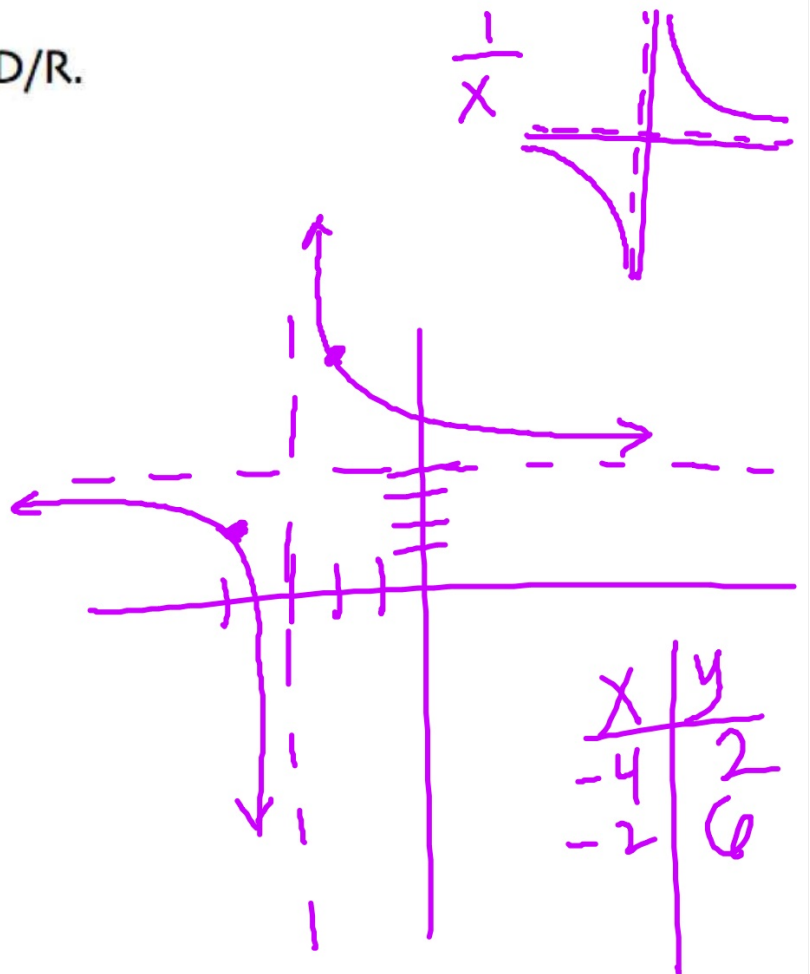
VA:  $x = -3$

HA:  $y = 4$

key pt (N/A)

D:  $\{x \mid x \neq -3\}$

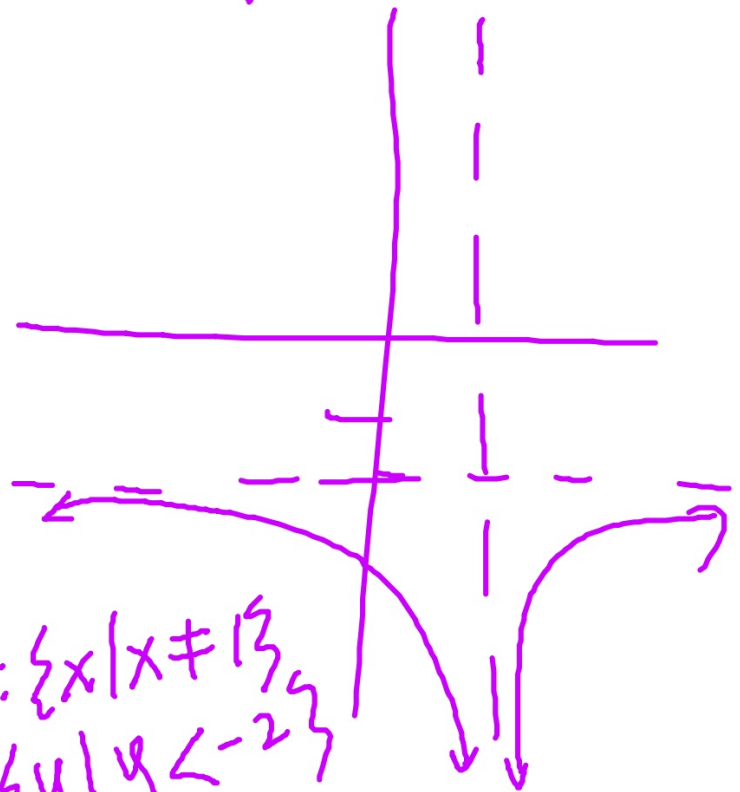
R:  $\{y \mid y \neq 4\}$



ex: Sketch and state the D/R.  $\frac{1}{x^2}$

b)  $y = \frac{-5}{(x-1)^2} - 2$

VA:  $x = 1$   
HA:  $y = -2$



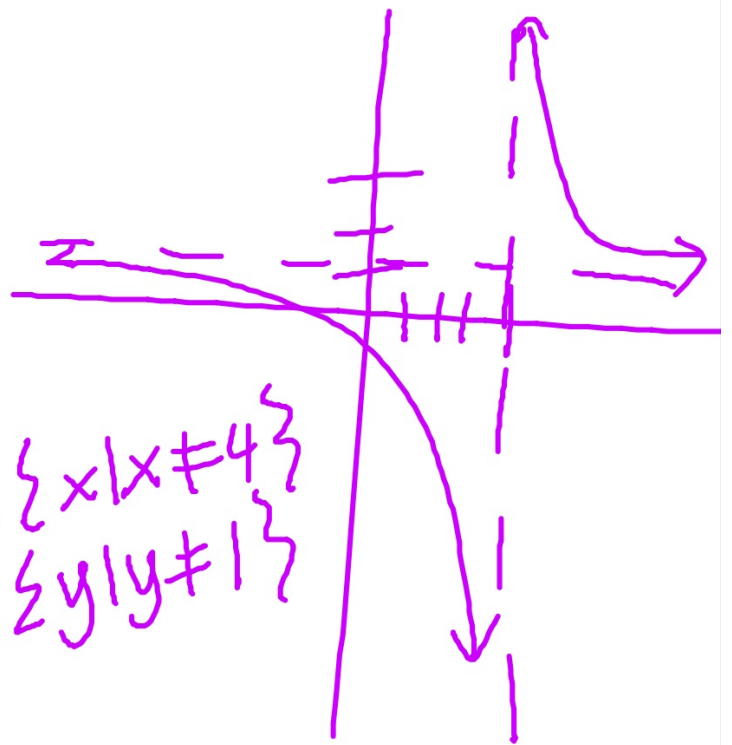
D:  $\{x \mid x \neq 1\}$   
R:  $\{y \mid y < -2\}$

ex: Sketch and state the D/R.

c)  $y = \frac{1}{x-4} + 1$

VA:  $x = 4$   
HA:  $y = 1$

D:  $\{x \mid x \neq 4\}$   
R:  $\{y \mid y \neq 1\}$

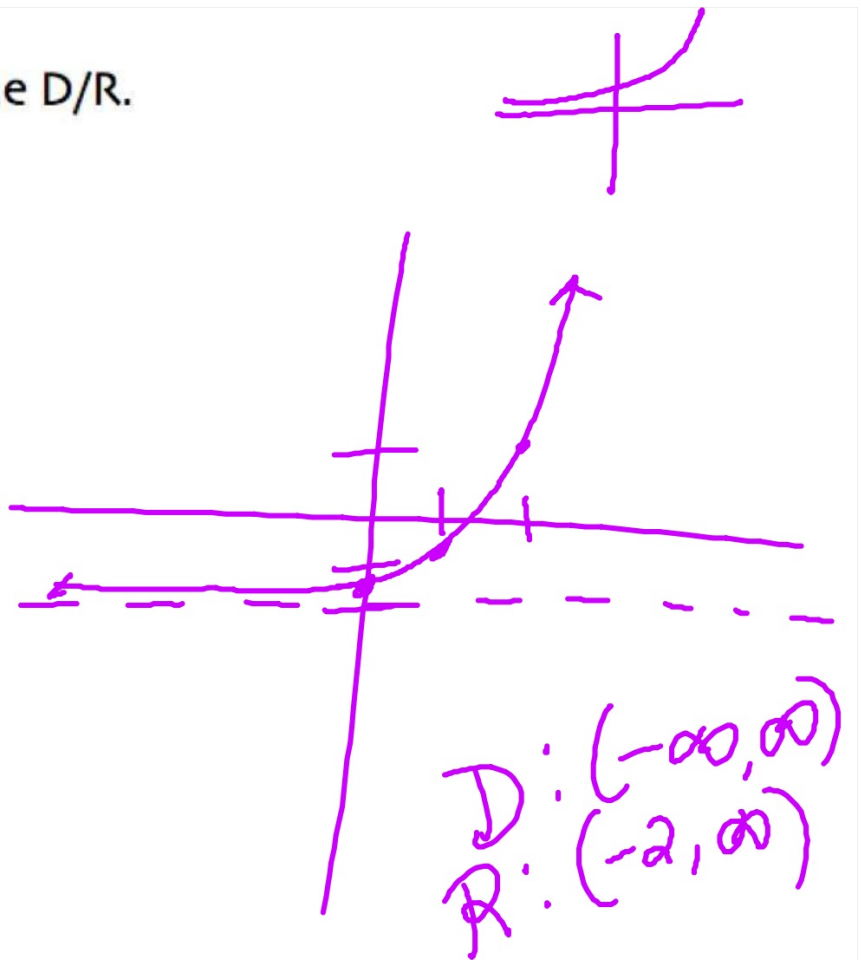


ex: Sketch and state the D/R.

d)  $y = 3^{x-1} - 2$

HA:  $y = -2$

x	y
0	$\frac{1}{3} - 2 = -\frac{5}{3}$
1	-1
2	1



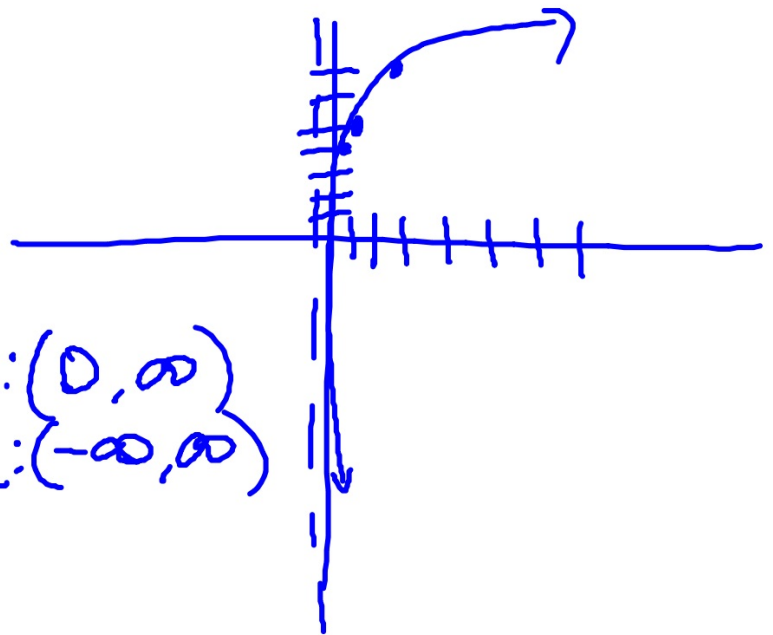
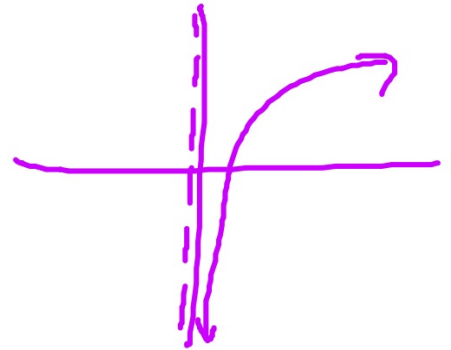


ex: Sketch and state the D/R.

e)  $f(x) = 2\ln x + 5$  VA:  $x=0$   
 $= 2\ln(x) + 5$

x	y
1	5
e	7
$e^{1/2}$	$2\ln(e^{1/2}) + 5$ $1 + 5 = 6$

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



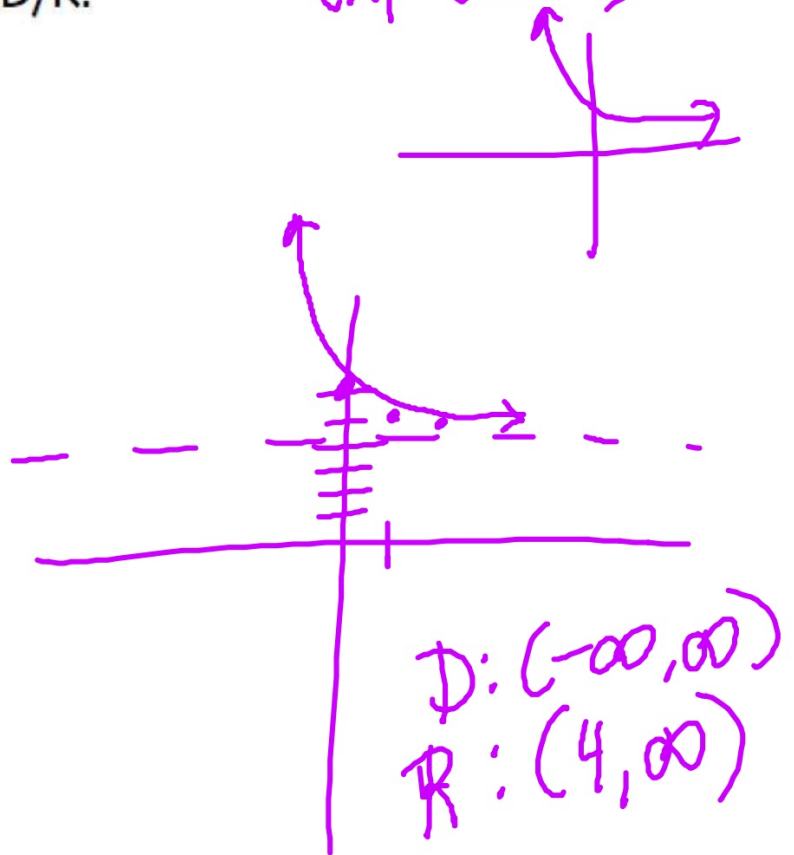
ex: Sketch and state the D/R.

$$f) y = \left(\frac{1}{2}\right)^{x-1} + 4$$

$$HA: y = 4$$

x	y
0	6
1	5
2	4.5

exp. decay



A hand-drawn graph of the function  $y = \sqrt{x-4}$ . The graph shows a coordinate system with a vertical y-axis and a horizontal x-axis. A curve starts at the point (4, 0) on the x-axis and extends upwards and to the right, with an arrow at its end. A small blue dot is placed at the origin (0, 0).

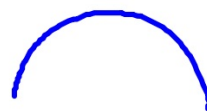
$$y = \sqrt{x-4}$$

A hand-drawn graph of the function  $y = \sqrt{4-x^2}$ . The graph shows a coordinate system with a vertical y-axis and a horizontal x-axis. A semi-circular arc is drawn above the x-axis, centered at the origin, with its endpoints at (-2, 0) and (2, 0). A small blue dot is placed at the origin (0, 0).

$$y = \sqrt{4-x^2}$$

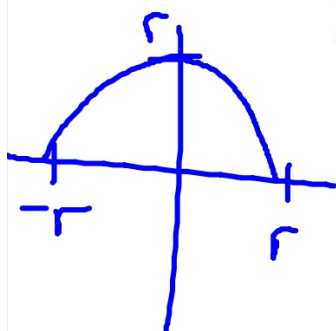
## Sketching Semicircles

$$y = \sqrt{r^2 - (x - h)^2} + k$$



### Process

1. Identify the radius: r
2. Identify the center: (h, k)
3. Is there a reflection? yes or no

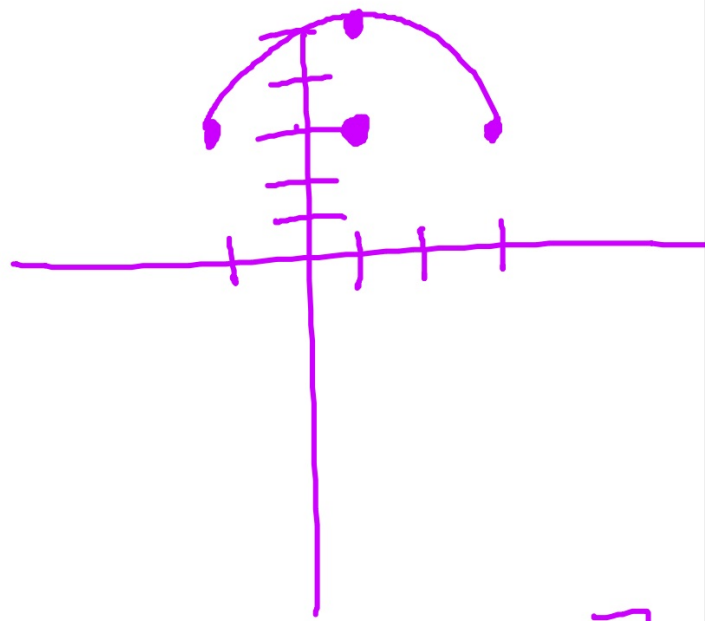


$$- \sqrt{r^2 - x^2}$$


ex: Sketch and state the D/R.

$$g) y = \sqrt{4 - (x-1)^2} + 3$$

$r = 2$   
center  $(1, 3)$   
reflect? NO



$$D: [-1, 3]$$
$$R: [3, 5]$$

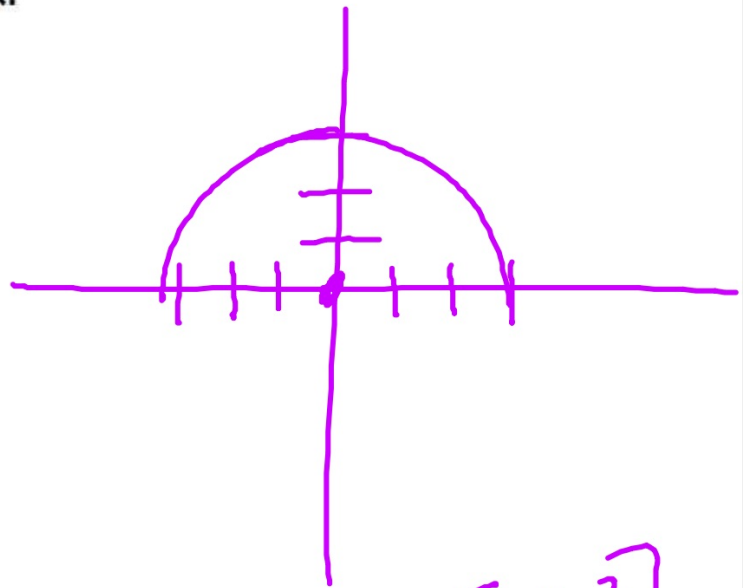
ex: Sketch and state the D/R.

$$h) y = \sqrt{9 - x^2}$$

$$r = 3$$

Center:  $(0, 0)$

reflect? no



$$D: [-3, 3]$$

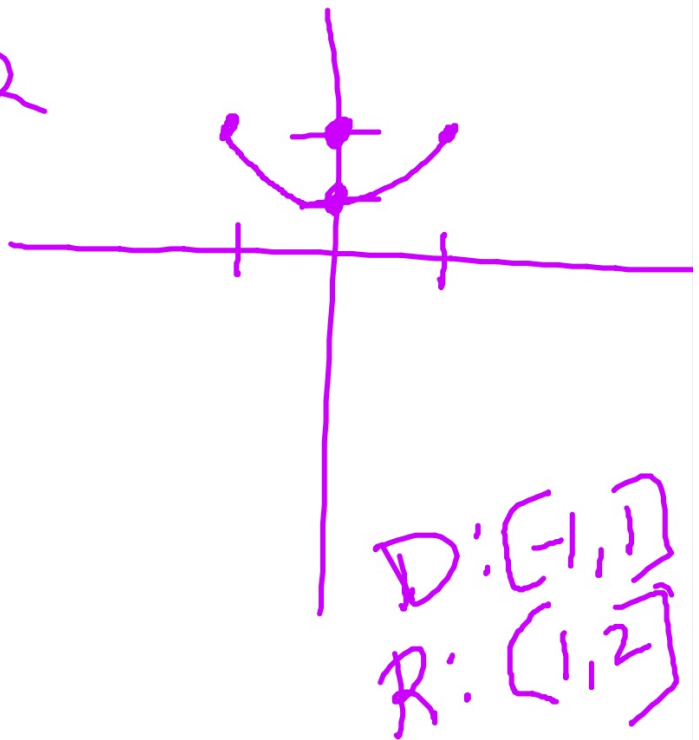
$$R: [0, 3]$$

ex: Sketch and state the D/R.

i)  $y = 2 - \sqrt{1 - x^2}$

$$y = -\sqrt{1 - x^2} + 2$$

radius: 1  
center: (0, 2)  
reflect: yes



## Sketching Greatest Integer

$$y = [x]$$

$$y = a[b(x-h)] + k$$

### Process

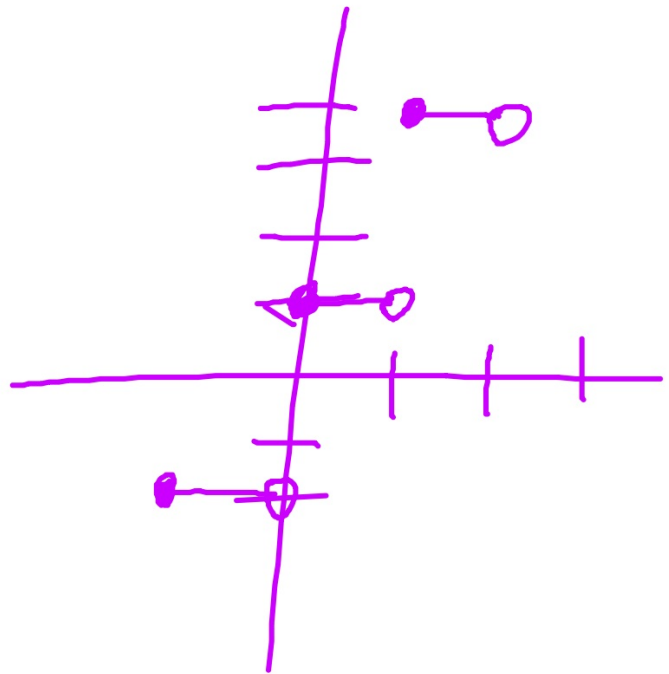
1. Identify the key point:  $(h, k)$
2. Identify the bar length:  $1/b$
3. Identify the vertical distance:  $|a|$
4. Is there a reflection?



ex: Sketch and state the D/R.

i)  $y = 3[x] + 1$

Key Pt (0, 1)  
bar length: 1  
dist. between: 3



ex: Sketch and state the D/R.

$$k) y = \frac{1}{2} \left[ \frac{x}{5} \right] = \frac{1}{2} \left[ \frac{1}{5} x \right]$$

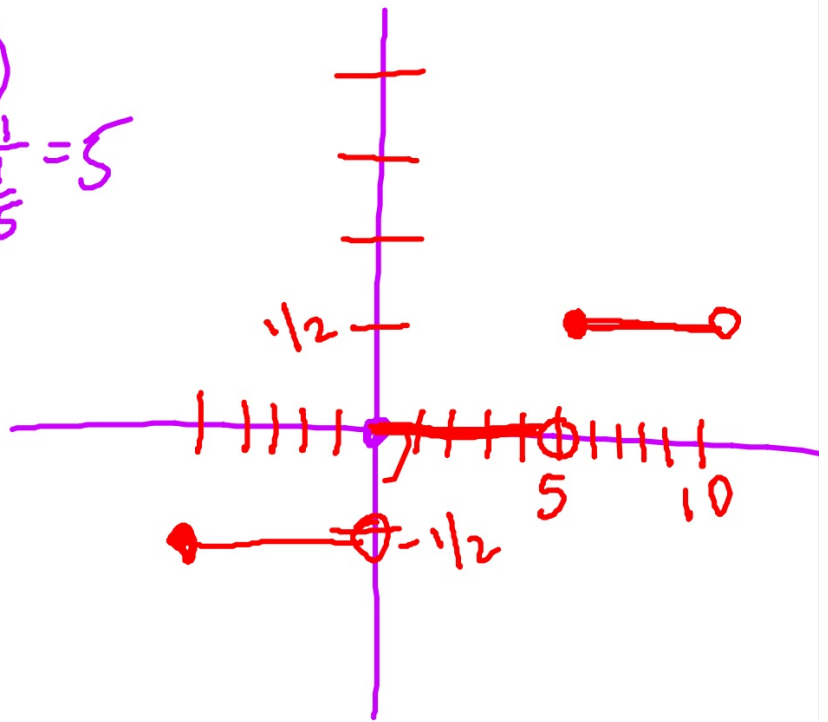
key pt:  $(0, 0)$

bar length:  $\frac{1}{b} = \frac{1}{\frac{1}{5}} = 5$

vert. dist.  $\frac{1}{2}$

reflect? NO

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



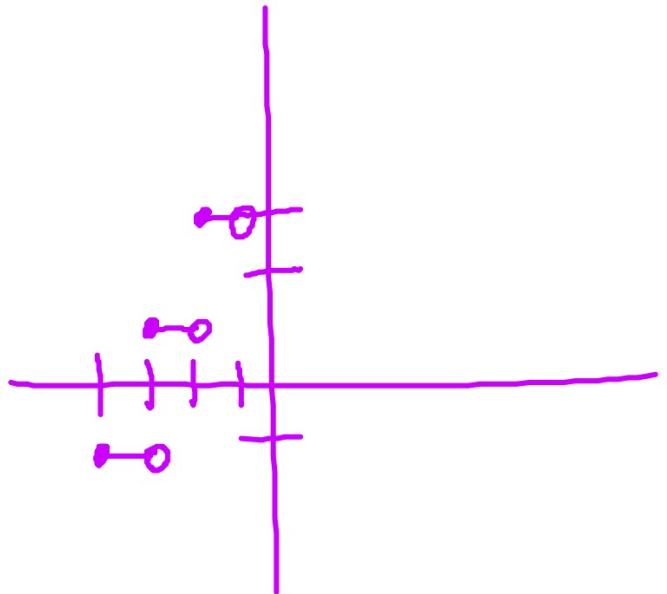
ex: Sketch and state the D/R.

1)  $y = 2[x+4] - 1$

Key Pt  $(-4, -1)$

bar length 1

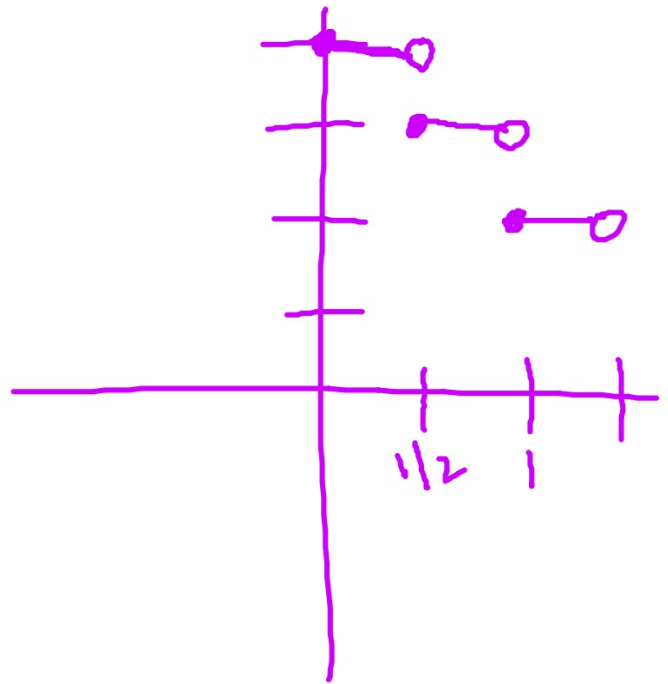
distance between: 2



ex: Sketch and state the D/R.

m)  $y = 4 - [2x]$

Key pt :  $(0, 4)$   
length of bar :  $1/2$   
distance between bars : 1  
reflect: yes



MIXED PRACTICE [desmos.com](https://www.desmos.com)

ex: Identify the parent function and sketch the graph. State the domain and range in any notation.

a)  $y = \frac{3}{(x+2)^2} + 5$

e)  $y = \ln(x-4)$

b)  $y = 3(x+2)^2 + 5$

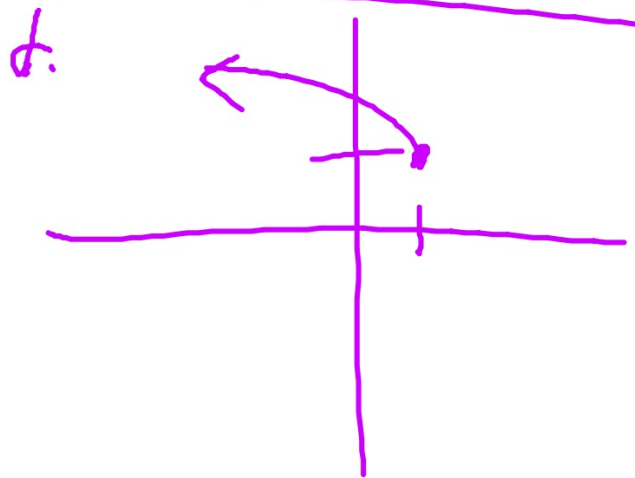
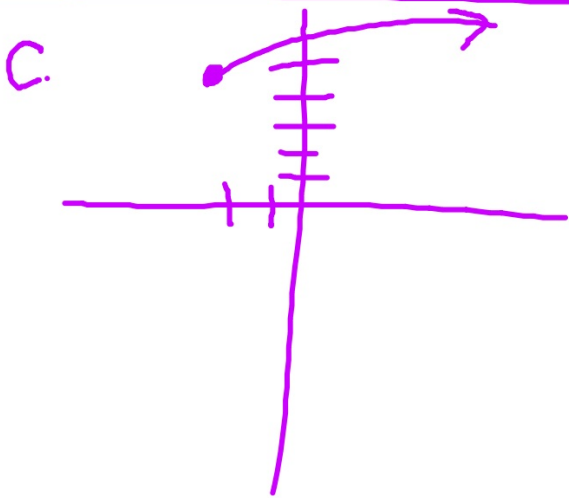
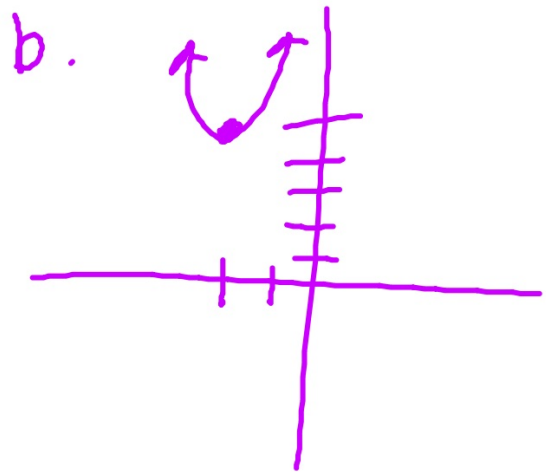
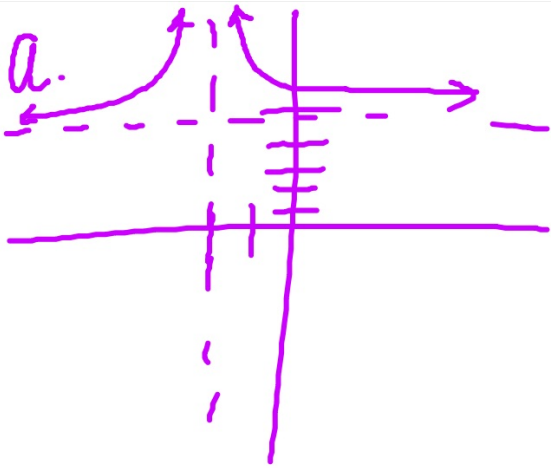
f)  $y = 3[2x-4] + 1$

c)  $y = 3\sqrt{x+2} + 5$

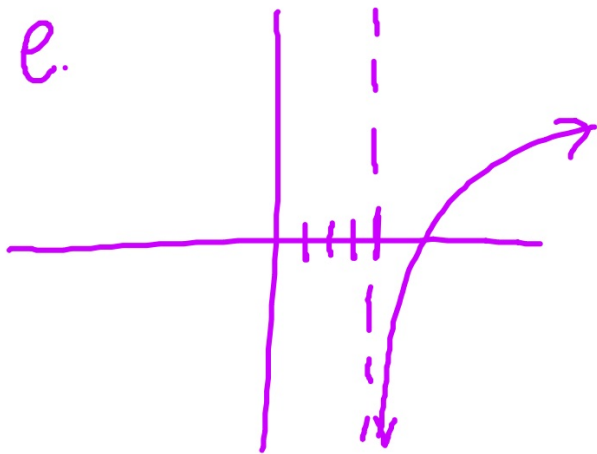
g)  $y = -\sqrt{9-x^2}$

d)  $y = \sqrt{1-x} + 1$

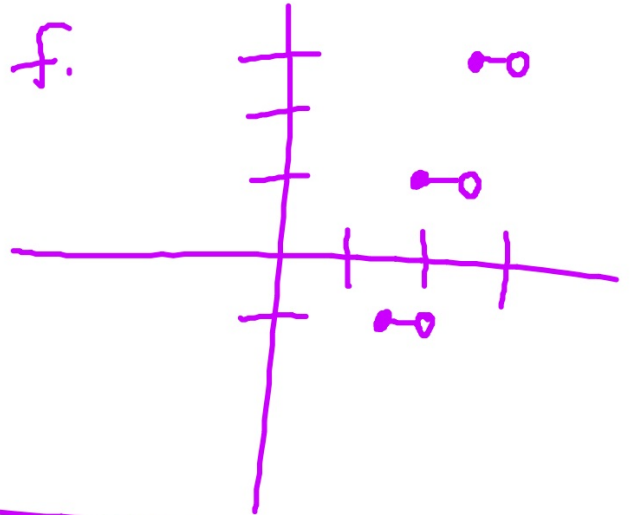
h)  $y = \sqrt[3]{x-4} + 1$



e.



f.



g.



h.

