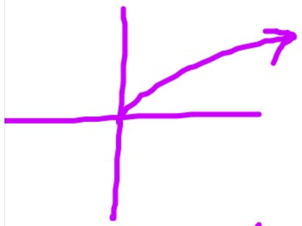
10.) $f(x)=\sqrt{5-x}-2$

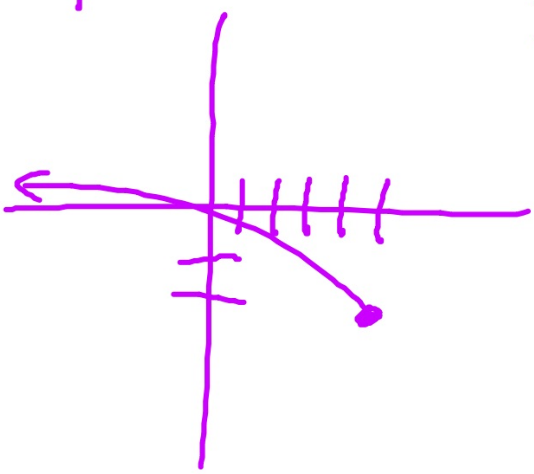


$=\sqrt{-(x-5)}-2$

reflect y-axis

right 5

down 2

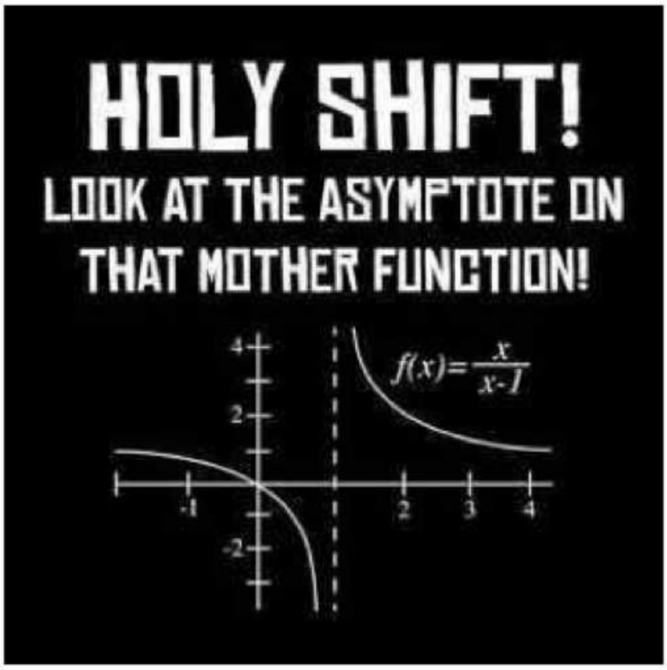


| x | y |
|---|---|
| 4 | -1 |
| 1 | 0 |

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

VA : $x = -3$

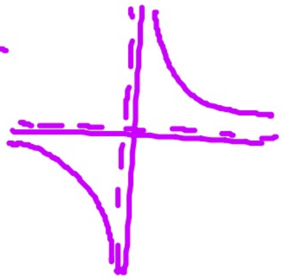
HA : $y = 4$

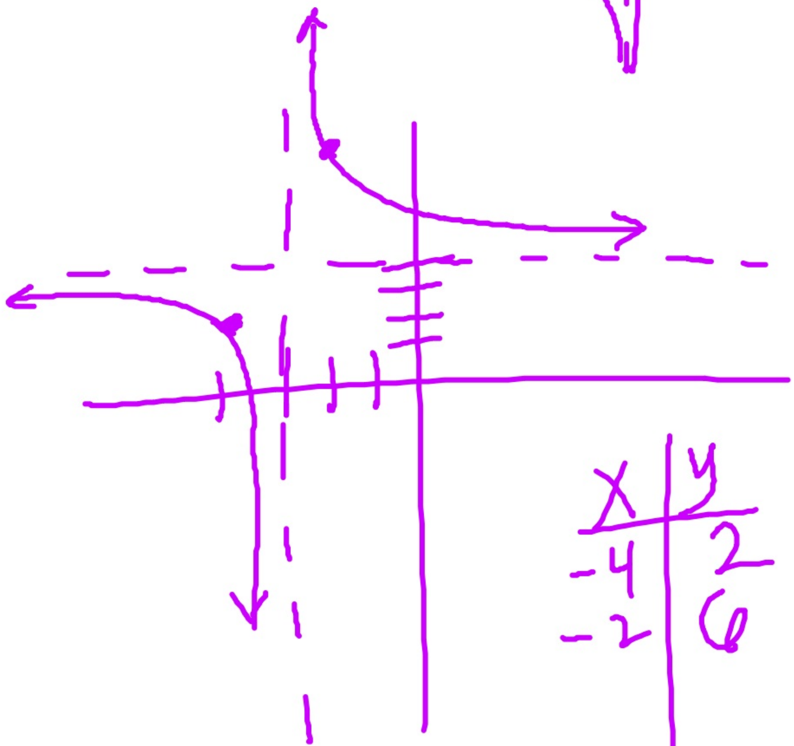
key pt (N/A)

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

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

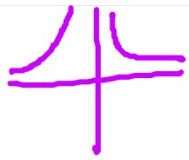
$\frac{1}{x}$





| x | y |
|---|---|
| -4 | 2 |
| -2 | 6 |

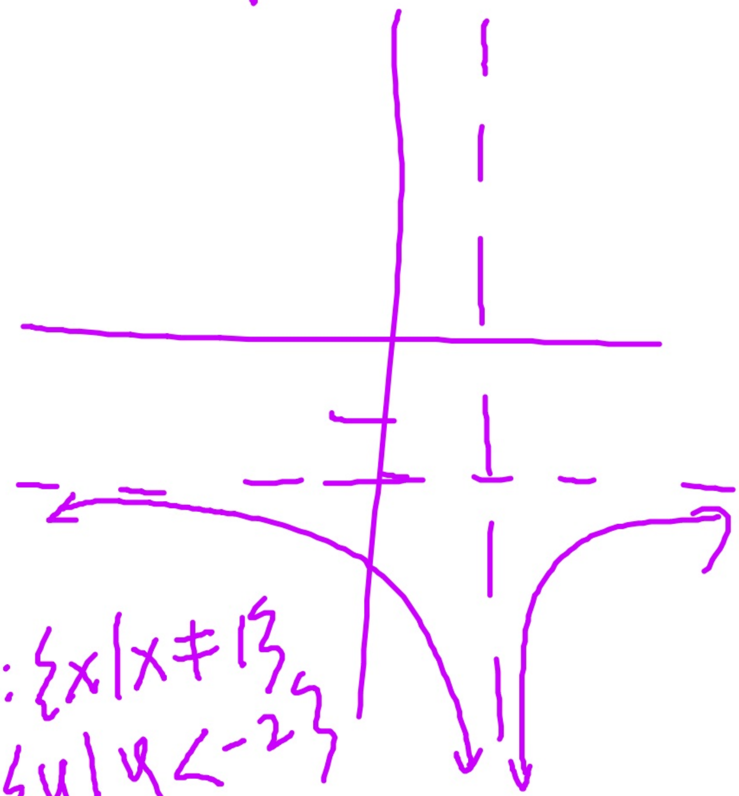
ex: Sketch and state the D/R. $\frac{1}{x^2}$



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

VA: $x = 1$

HA: $y = -2$



D: $\{x \mid x \neq 1\}$

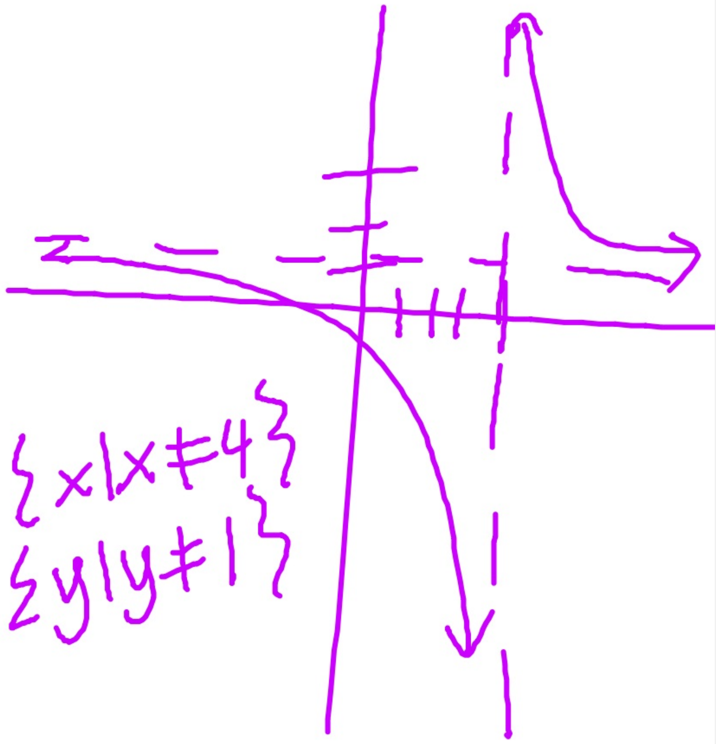
R: $\{y \mid y < -2\}$

ex: Sketch and state the D/R.

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

VA: $x = 4$

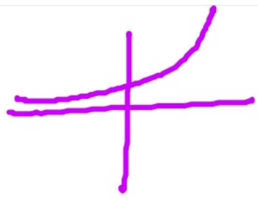
HA: $y = 1$



D: $\{x \mid x \neq 4\}$

R: $\{y \mid y \neq 1\}$

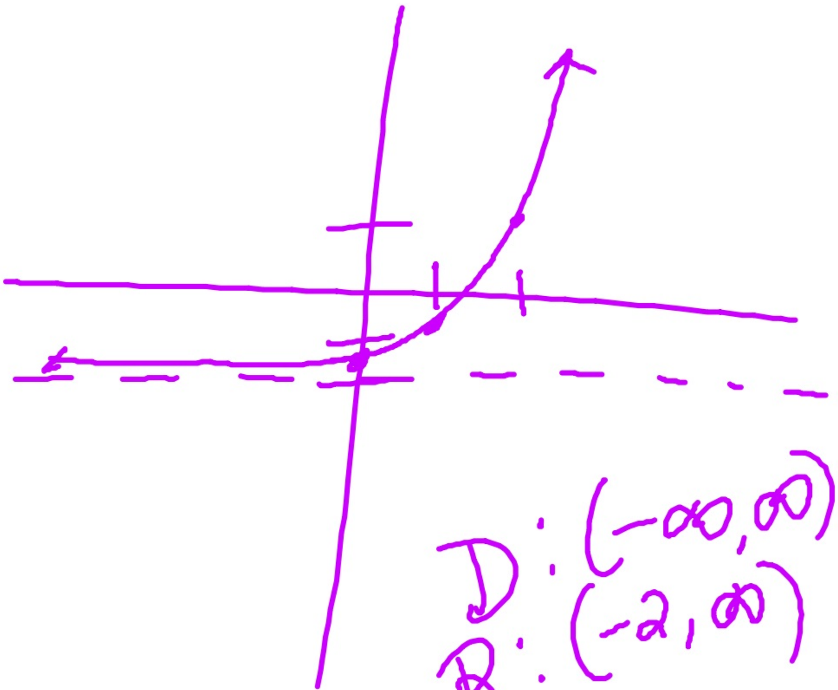
ex: Sketch and state the D/R.



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

HA: $y = -2$

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



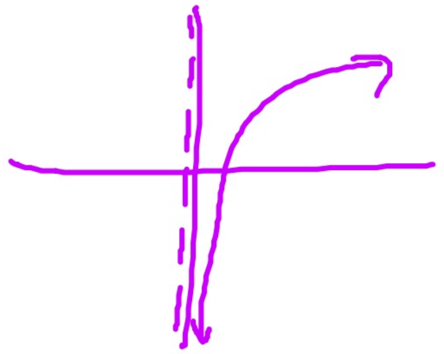
D: $(-\infty, \infty)$

R: $(-2, \infty)$

ex: Sketch and state the D/R.

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

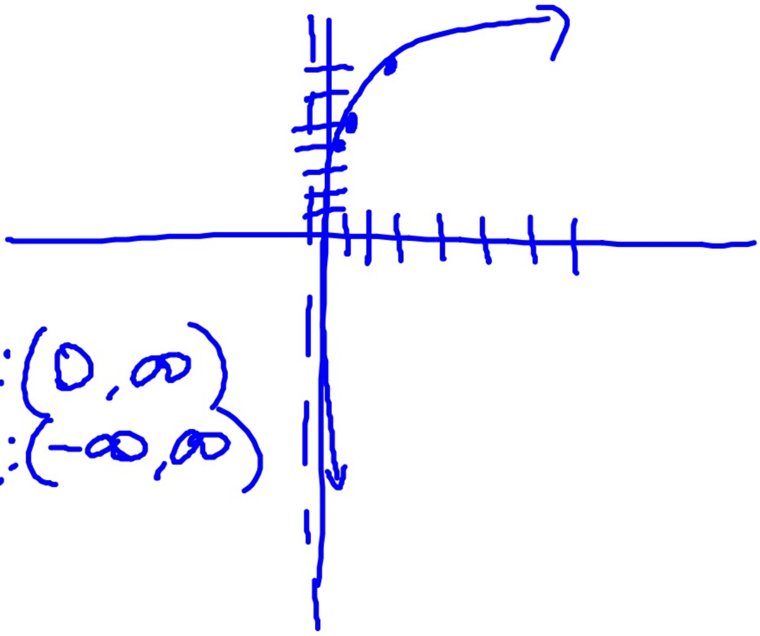
$= 2\ln(x) + 5$



| $x$ | $y$ |
|---|---|
| $1$ | $5$ |
| $e$ | $7$ |
| $e^{1/2}$ | $2\ln e^{1/2} + 5$ <br> $1+5=6$ |

D: $(0, \infty)$

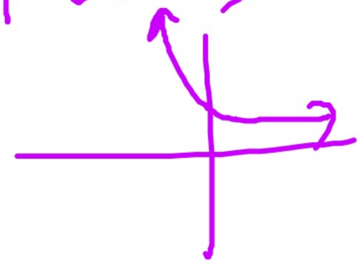
R: $(-\infty, \infty)$



ex: Sketch and state the D/R.

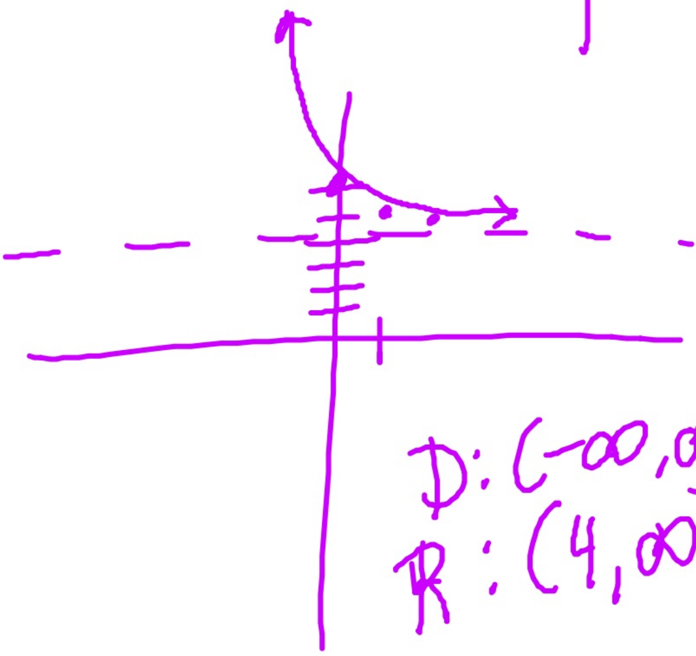
f) $y = \left(\frac{1}{2}\right)^{x-1} + 4$

exp. decay

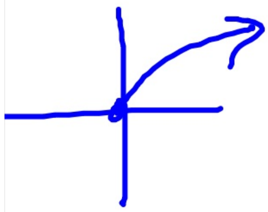


HA: $y = 4$

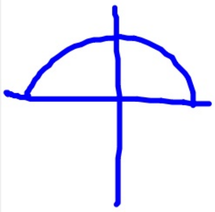
| $x$ | $y$ |
| --- | --- |
| 0 | 6 |
| 1 | 5 |
| 2 | 4.5 |



D: $(-\infty, \infty)$
R: $(4, \infty)$



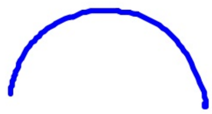
$$y = \sqrt{x-4}$$

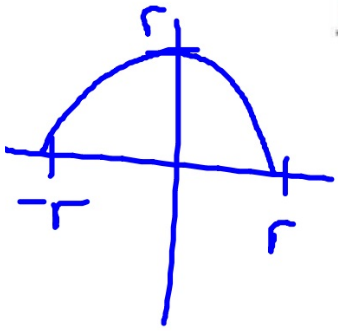


$$y = \sqrt{4-x^2}$$

## Sketching Semicircles

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

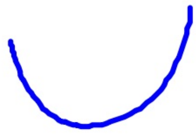





### Process

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

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



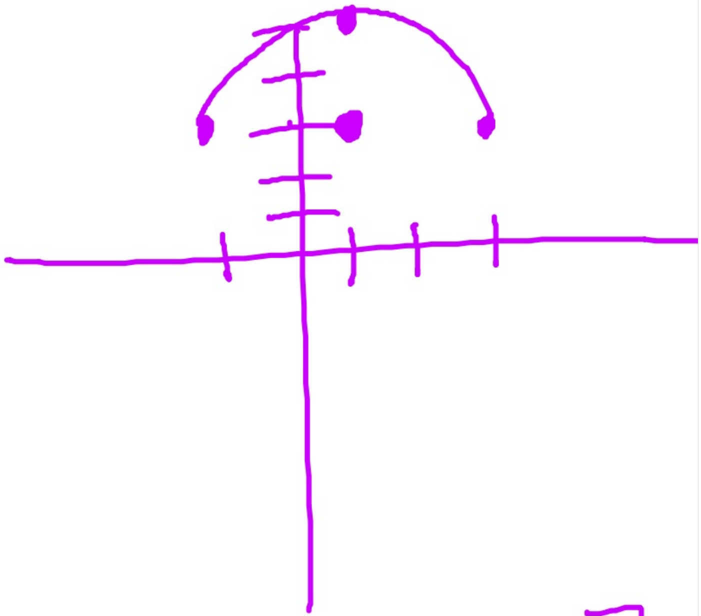
ex: Sketch and state the D/R.

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

$r=2$

center $(1,3)$

reflect? no



D: $[-1,3]$

R: $[3,5]$

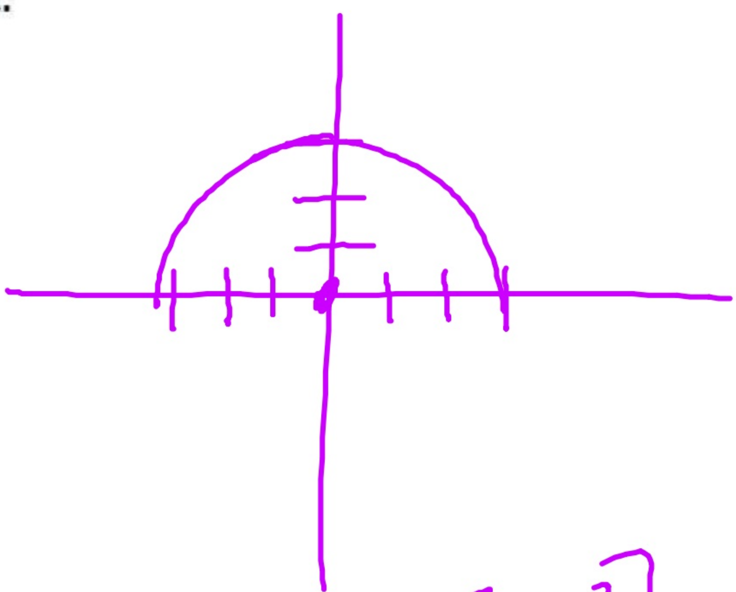
ex: Sketch and state the D/R.

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.

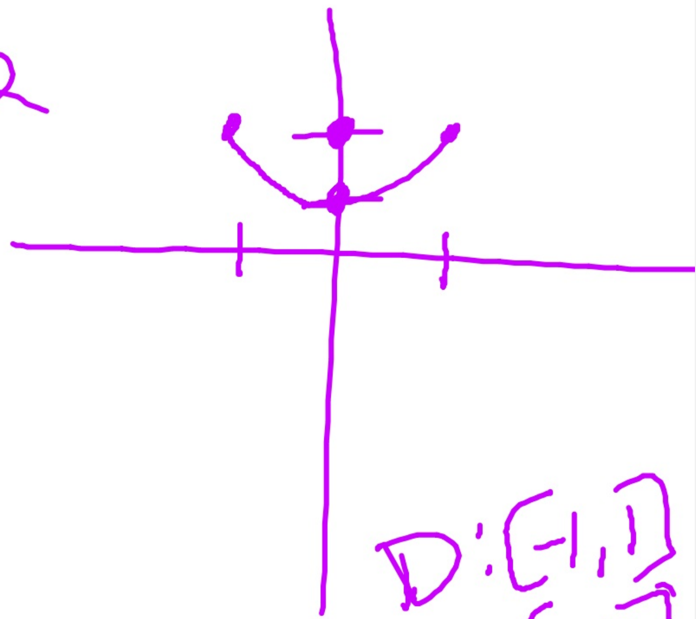
i) $y = 2 - \sqrt{1 - x^2}$

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

radius : 1

center: (0, 2)

reflect: yes



D: $[-1, 1]$

R: $[1, 2]$

## 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?

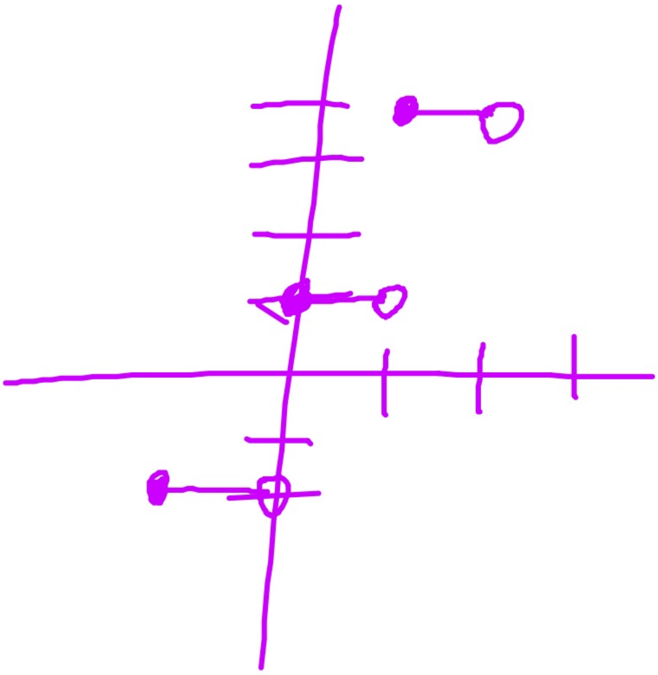
ex: Sketch and state the D/R.

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

Key Pt (0, 1)

bar length: 1

dist. between: 3



ex: Sketch and state the D/R.

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

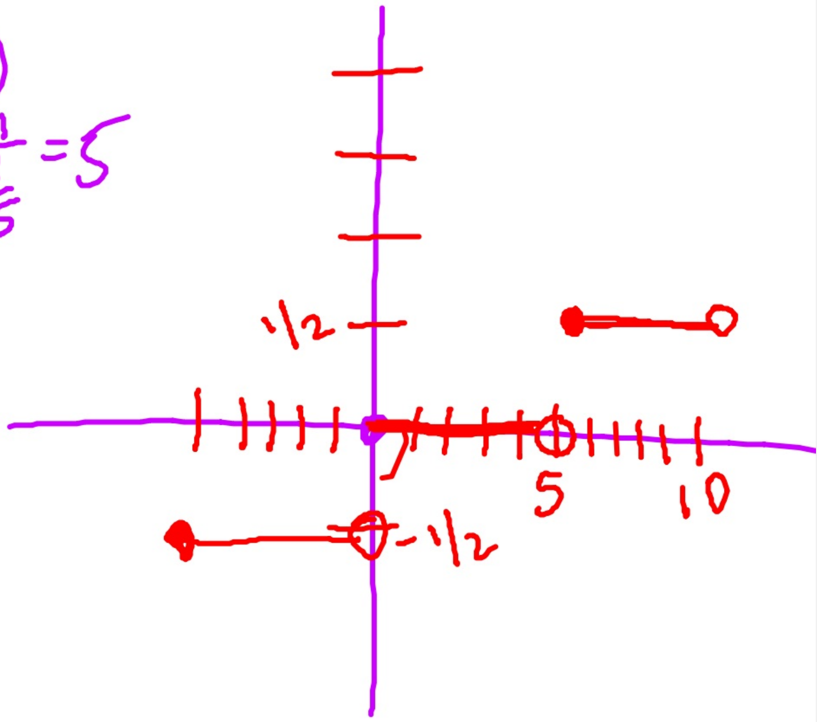
Key pt: $(0,0)$

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

vert. dist. $1/2$

reflect? NO

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



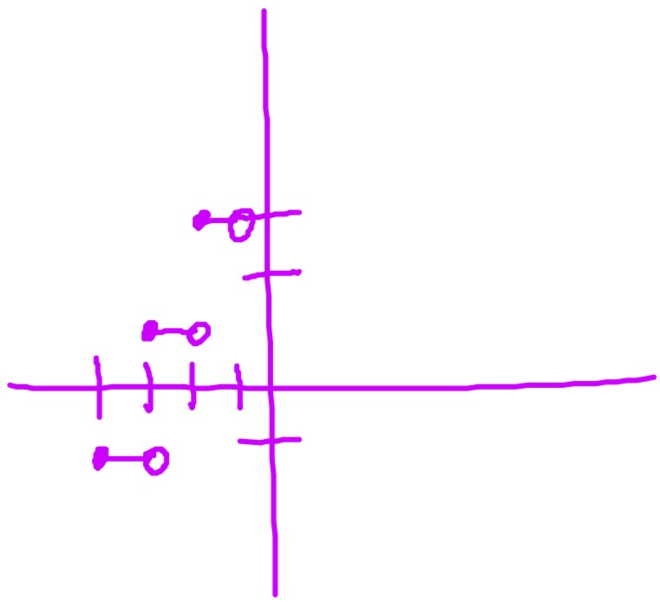
ex: Sketch and state the D/R.

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

Key pt $(-4,-1)$

bar length $1$

distance between : 2



ex: Sketch and state the D/R.

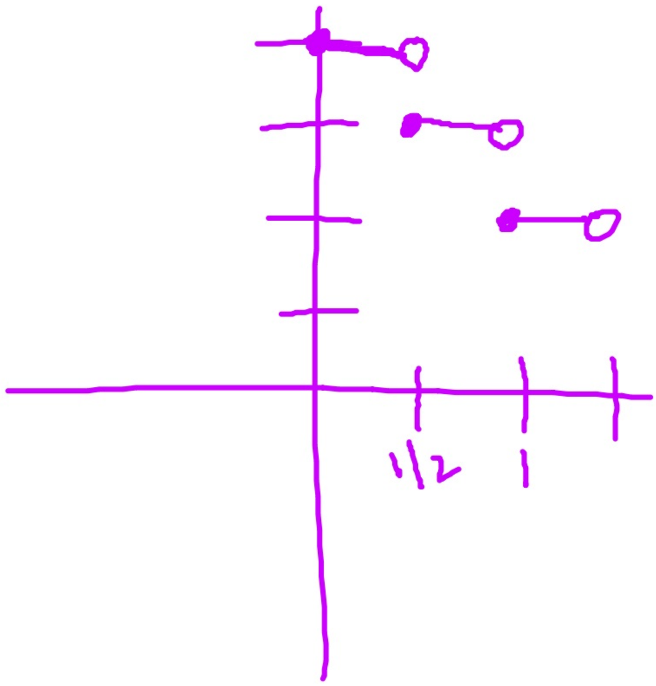
m) $y = 4 - [2x]$

Key pt : (0,4)

length of bar : 1/2

distance between bars : 1

reflect : yes



MIXED PRACTICE

desmos.com

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

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

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

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

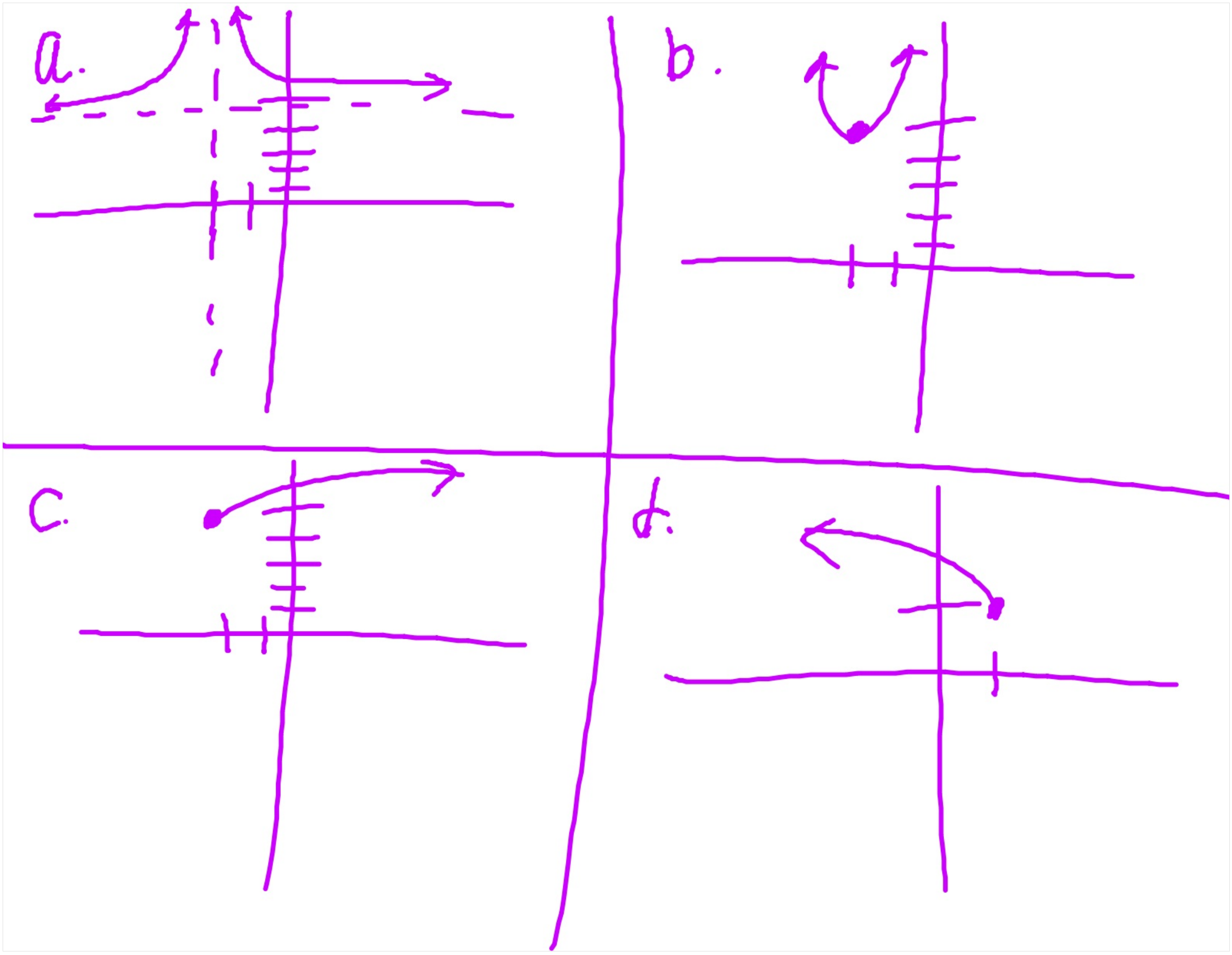
d) $y = \sqrt{1-x} + 1$

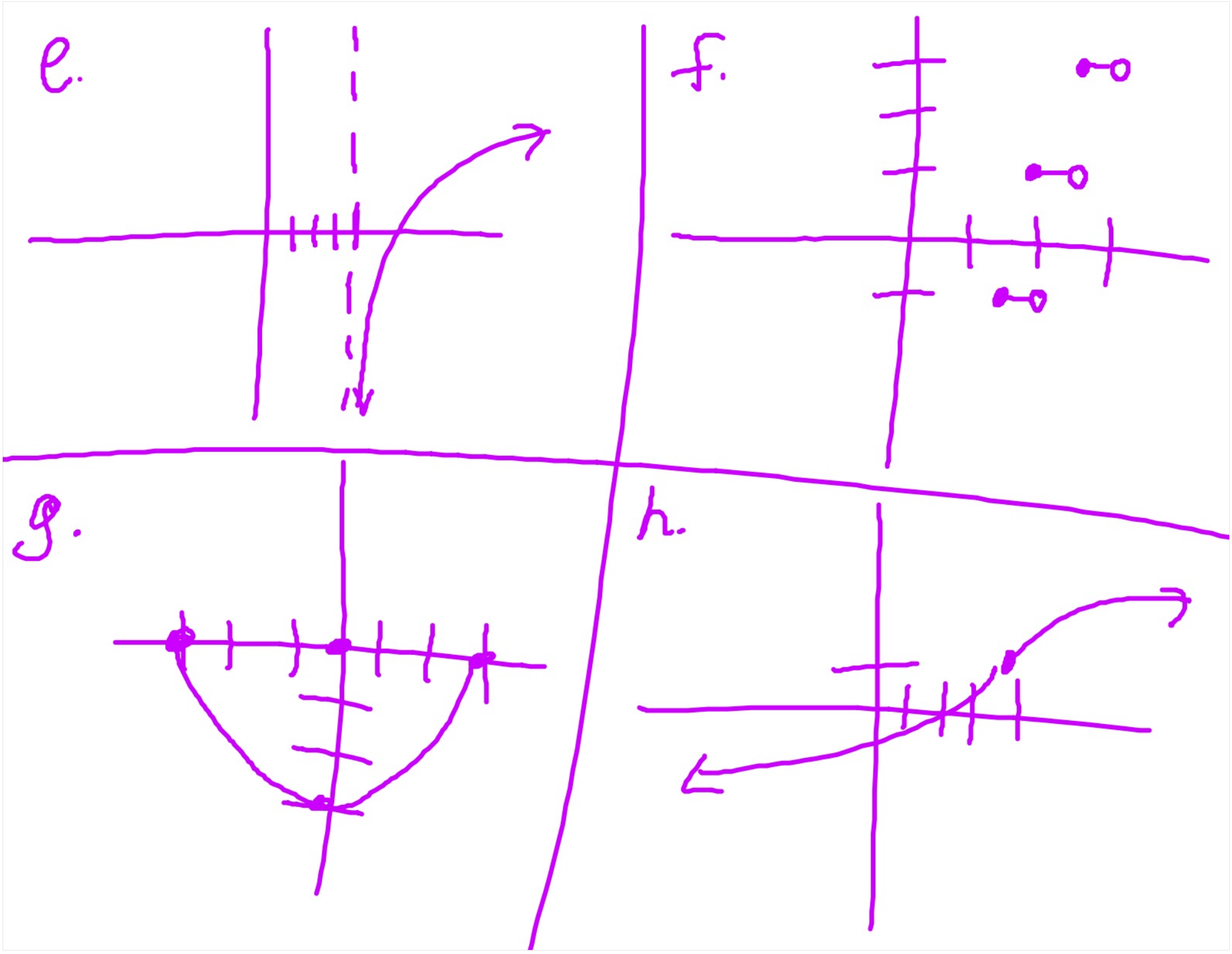
e) $y = \ln(x-4)$

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

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

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


a.
b.
c.
d.


e.
f.
g.
h.