

MA110. F 9/16.

- Gallery Hop tonight.
- Homework, too!

- Exam on T,

9/20 7³⁰ 9³⁰

- Exam covers thru W.'s lecture.

Graph of $y = f(x)$
is the set of points
satisfying

$$y = f(x).$$

$$\text{so } y = f(x) + 2$$

amounts to adding
2 units to the
y-coordinate.

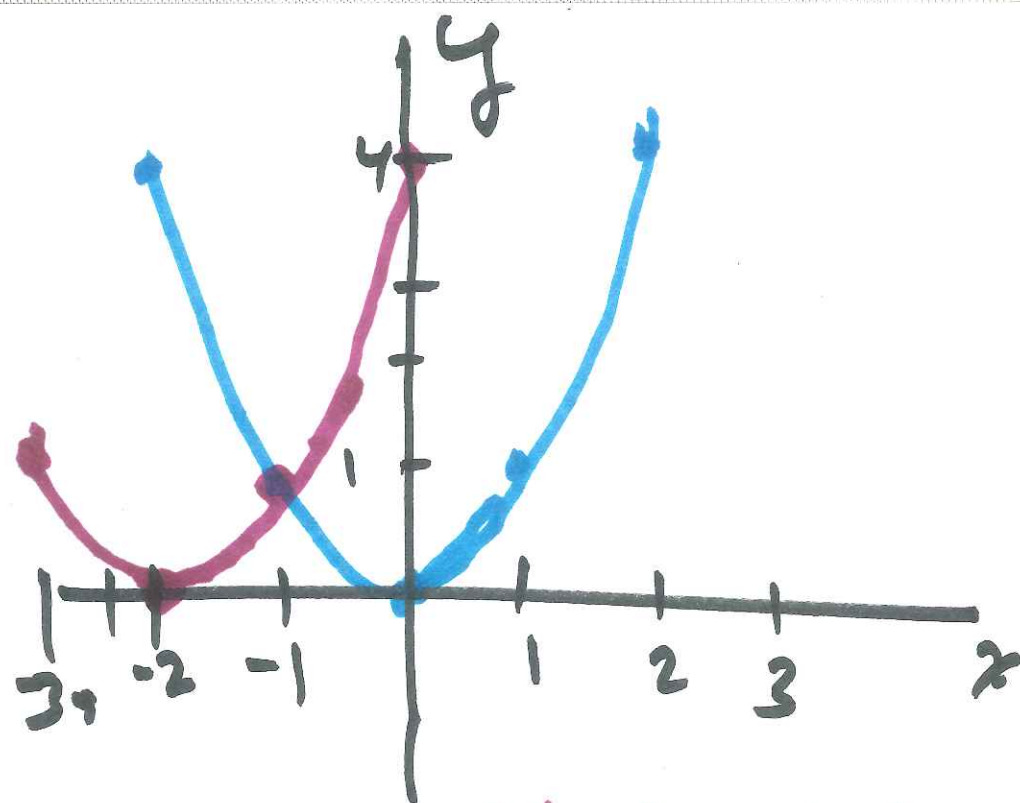
vertical shift.

$$y = f(x) + b$$

~~ammon~~ The graph

$$g(x) = f(x) + b$$

by shifting the graph of f up b units ($b > 0$) or down $|b|$ units if $b < 0$.



graph $f(x) = x^2$
and $g(x) = (x+2)^2$

x	$g(x)$
-3	1
-2	0
-1	1
0	4
1	9

Shift left 2 units to turn the blue graph into the purple graph.

If (a, b) is on
the graph of $f(x)$.

then $(a-2, b)$ on

$$g(x) = f(x+2).$$

Since $b = f(a)$

so $b = f(a-2+2)$.

This gives a shift
of 2 units to the
left.

Graph

$$g(x) = x^2 - 6x + 5.$$

Complete the square

$$x^2 - 6x + 5 + 4 - 4$$

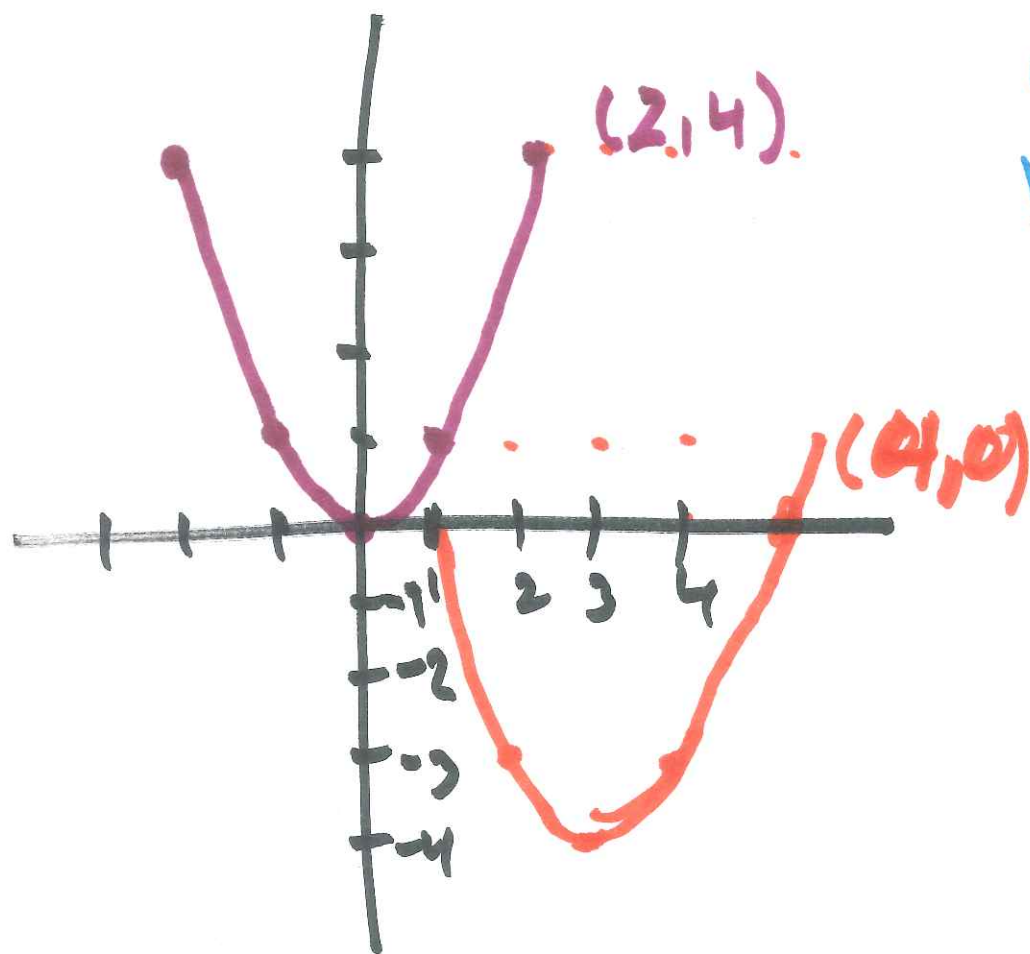
$$x^2 - 6x + 9 - 4.$$

$$g(x) = (x-3)^2 - 4.$$

- Graph x^2

- Graph $(x-3)^2$ by
shifting right 3 units

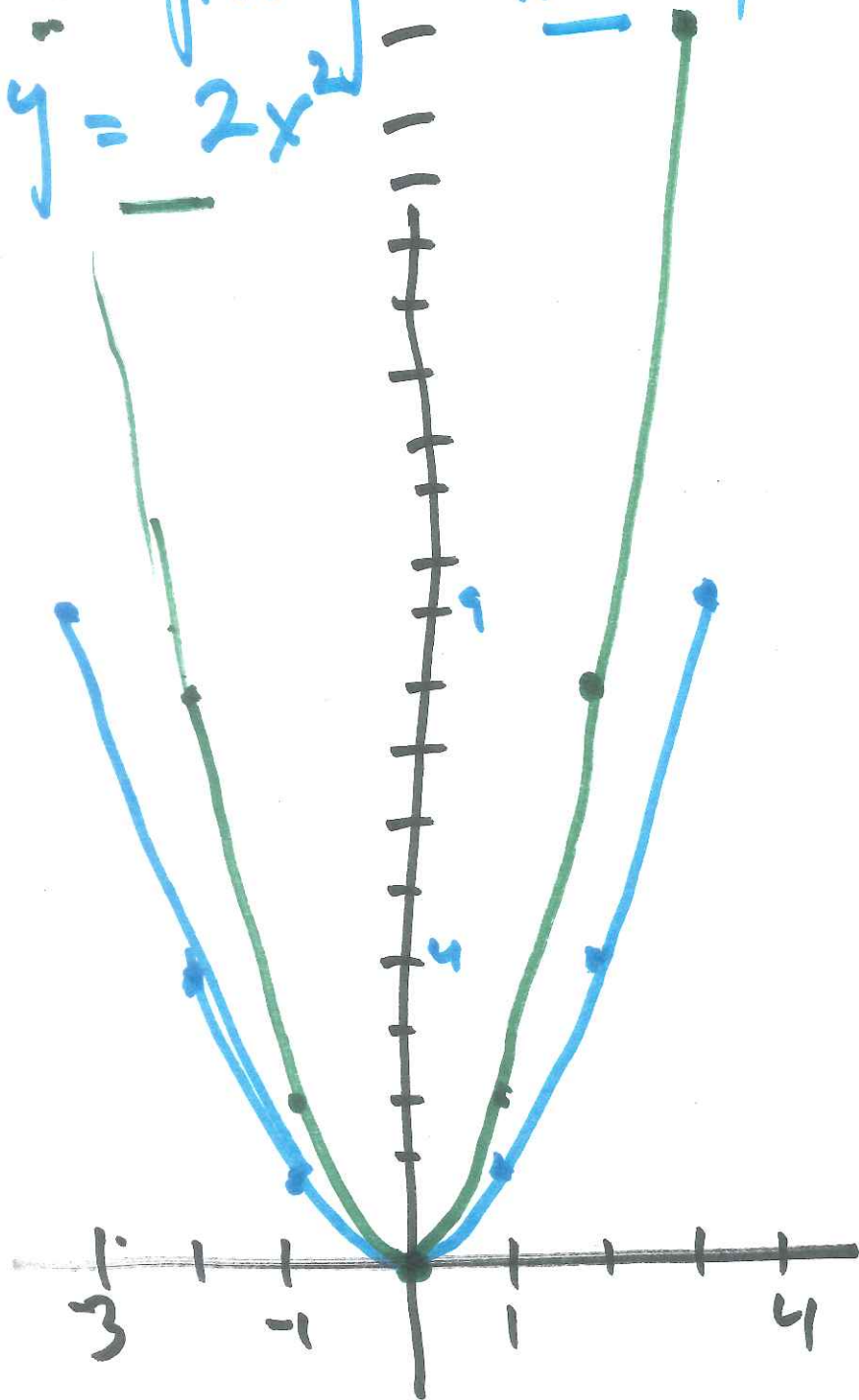
Graph $g(x) = (x-3)^2 - 4$ by shifting down 4 units.



Graph of $f(x)$ and $c f(x)$.
 $c > 0$.

$c > 1$. Stretching vertically by a factor of c .
 $0 < c < 1$, then the graph is shrunk vertically by a factor of c .

Graph $y = x^2$ and
 $y = 2x^2$



~~Q~~ EEF

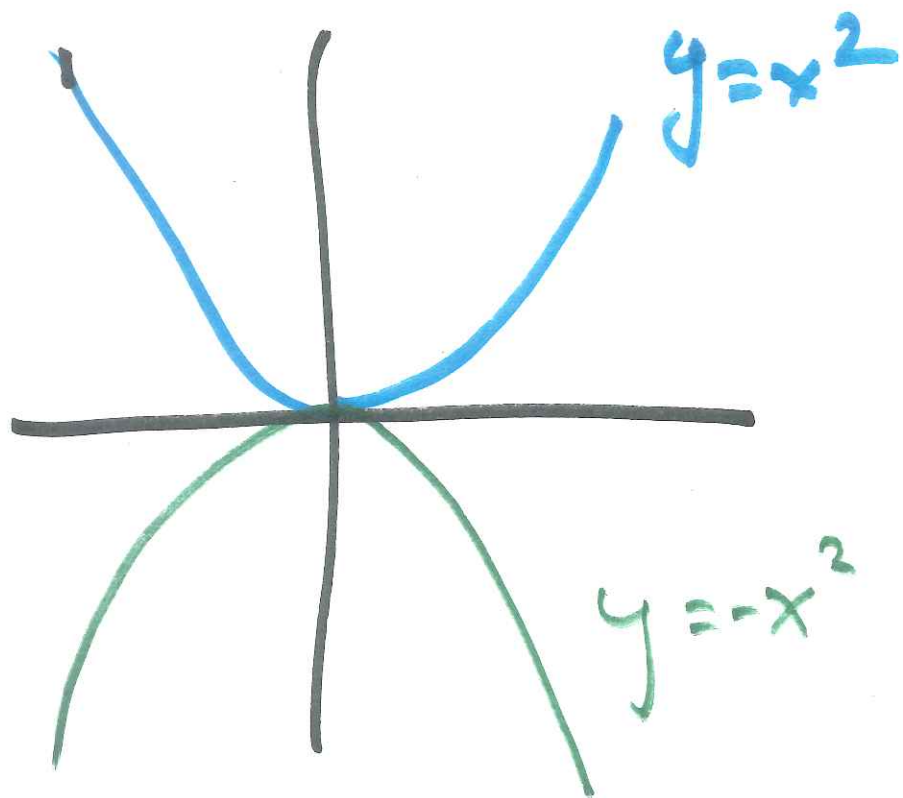
$$g(x) = 2f(x).$$

$$f(x) = \frac{1}{2}g(x).$$

Reflections.

$$c < 0. \quad c = -1 \cdot |c|.$$

The graph $g(x) = -f(x)$ is obtained from the graph of f by reflecting in the x -axis.



Graph
 $f(x) = \frac{x+1}{x+2}$

$$f(x) = \frac{x+1+1-1}{x+2}$$

$$= \frac{x+2}{x+2} - \frac{1}{x+2}$$

$$= 1 - \frac{1}{x+2}$$

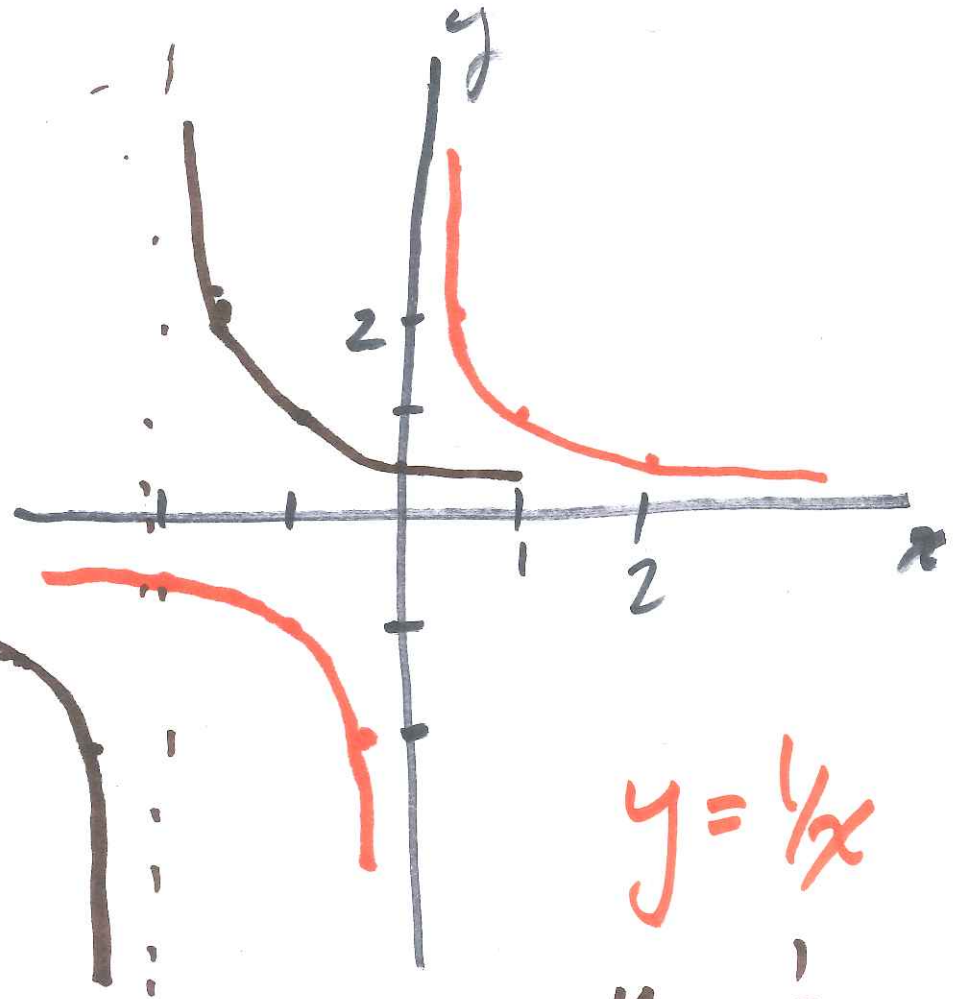
Start w/ graph $y = \frac{1}{x}$. —

Shift 2 units to the left to obtain $\frac{1}{x+2}$ —

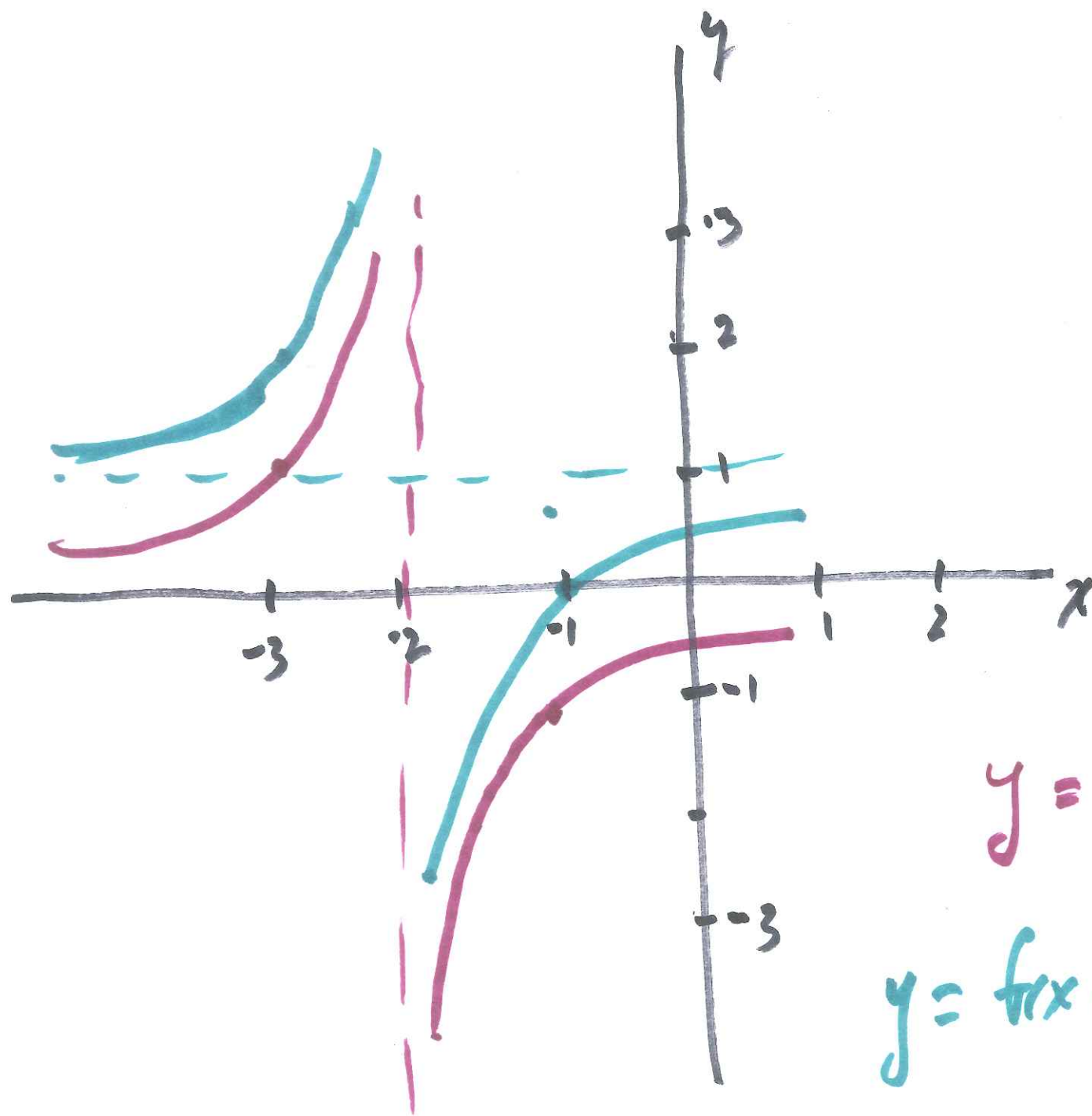
Reflect $\frac{1}{x}$ -axis
to obtain the
graph $y = \frac{-1}{x+2}$.

Shift up one unit
to obtain

$$f(x) = 1 - \frac{1}{x+2}$$

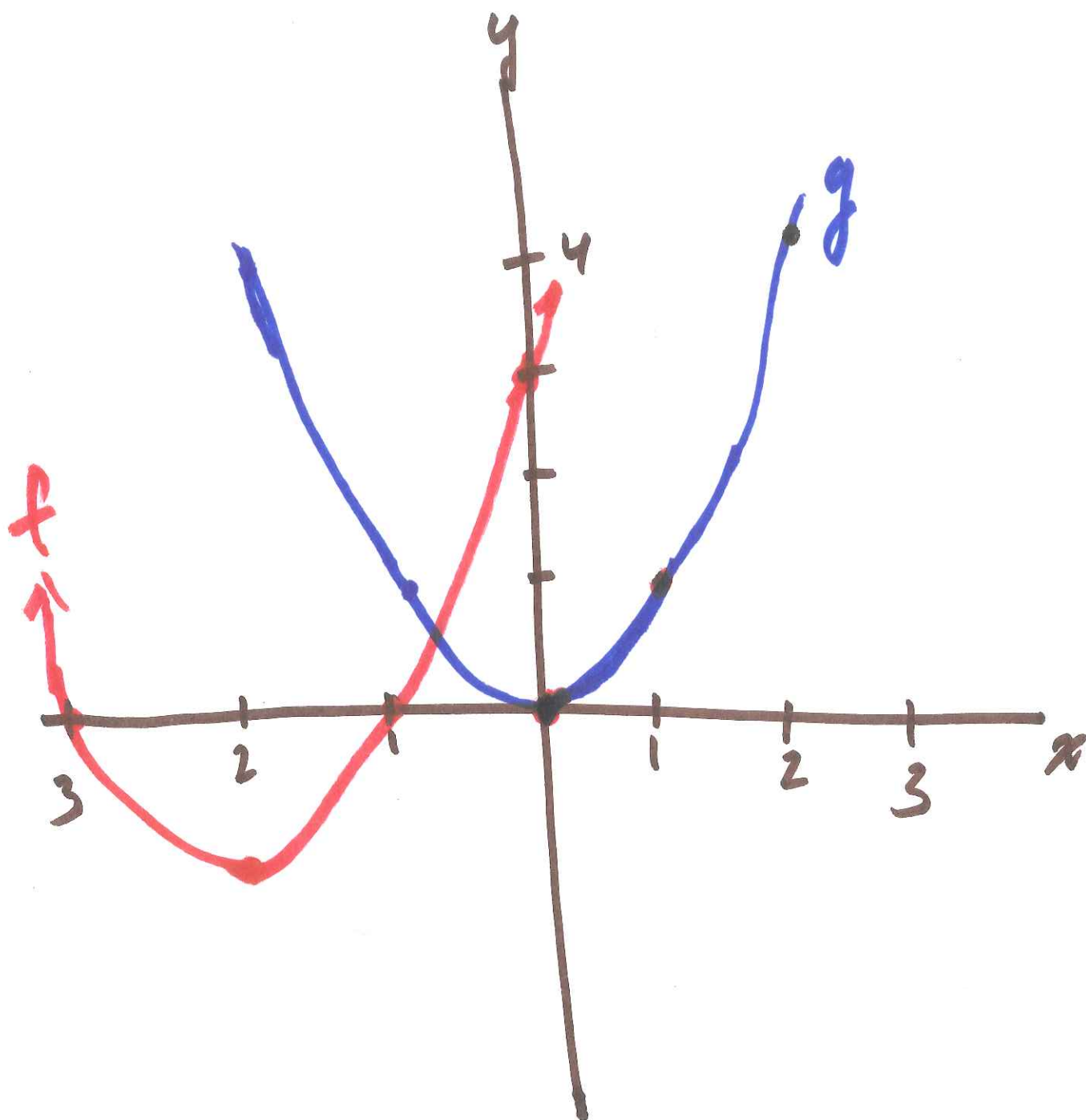


$$y = \frac{1}{x}$$
$$y = \frac{1}{x+2}$$



$$y = -\frac{1}{x+2}$$

$$y = f(x) = 1 - \frac{1}{x+2}$$



Reef question - $g(x) = f(x-2) + 1$.