$$\mathcal{D}(f \circ g) = \{ x \mid x \in \mathcal{D}(g) \text{ and } g(x) \in \mathcal{D}(f) \}$$

= the set of all x such that x is in the domain of g and $g(x)$ is in the domain of f.

from last time, $f(x) = \sqrt{x}$, $g(x) = \sqrt[3]{1-x}$

$\mathcal{D}(f \circ g)$: $\mathcal{D}(f) = \{ x \mid x \geq 0 \}$

$\mathcal{D}(g) = \mathbb{R}$ $\sqrt[3]{\text{Any}} \in \mathbb{R}$

$$\mathcal{D}(f \circ g) = \{ x \mid x \in \mathcal{D}(g) \text{ and } g(x) \in \mathcal{D}(f) \}$$

$x \in \mathcal{D}(g)$: All reals, No restriction

Need $g(x) \geq 0$ → All we need.

$$g(x) \geq 0$$

$$\sqrt[3]{1-x} \geq 0$$

$$1 - x \geq 0$$

$$1 \geq x$$

$$\mathcal{D} = \{ x \mid 1 \geq x \}$$

CI Homework: I'm looking for the forms:

1. Staple top left corner
2. Margin .. .. ..
3. Complete context of the question.
4. Leave room between problems.

Not very convincing on homework

Going from

$x^2 - 5x > 0$

to

$x = 5, \; x = 0$ } Good

to

$x \in (-\infty, 0) \cup (5, \infty)$ } Unconvincing.

Show me you know WHY.

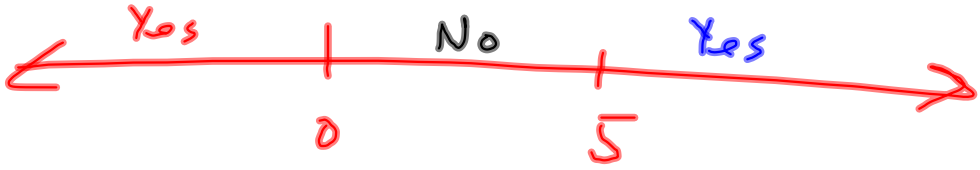
Sign Pattern.

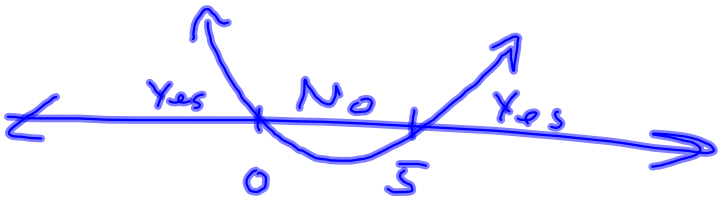
$x = 0, \; x = 5$ divides $\mathbb{R}$ into 3 intervals

$x^2 - 5x > 0$

	Test	Conclude	
$(-\infty, 0)$	-1	$(-1)^2 - 5(-1) = 1 + 5 = 6$	Yes!
$(0, 5)$	1	$1^2 - 5(1) = -4$	No
$(5, \infty)$	6	$6^2 - 5(6) = 6$	Yes

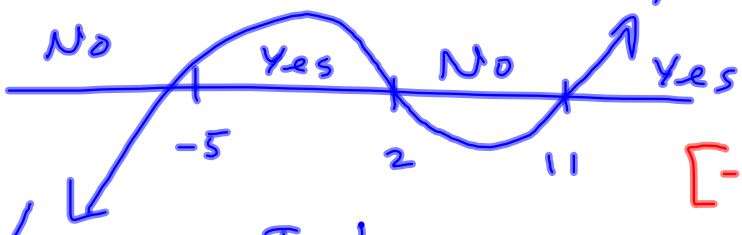
$x \in \boxed{(-\infty, 0) \cup (5, \infty)}$





$(x-2)(x+5)(x-11) \geq 0$

$\because$ a $+x^3$



$[-5,2] \cup [11,\infty)$

	Test
$(-\infty,-5)$	-6
$(-5,2)$	0
$(2,11)$	3
$(11,\infty)$	12

etc.

Plug in test values & see if output is + or −.

>0 <0.

Find the functions (a) $f \circ g$, (b) $g \circ f$, (c) $f \circ f$, and (d) $g \circ g$ and their domains.

35. $f(x) = x + \frac{1}{x}, \quad g(x) = \frac{x+1}{x+2}$

$(f \circ g)(x) = f(g(x))$

$= \frac{x+1}{x+2} + \frac{1}{\left(\frac{x+1}{x+2}\right)} = \frac{x+1}{x+2} + \frac{x+2}{x+1}$

$\mathcal{D}(f \circ g) = \{x \mid x \in \mathcal{D}(g) \text{ & } g(x) \in \mathcal{D}(f)\}$

$\mathcal{D}(f) = \mathbb{R} \setminus \{0\}$

$\mathcal{D}(g) = \mathbb{R} \setminus \{-2\}$

$\mathcal{D}(f \circ g) = \{x \mid x \neq -2 \text{ and } \frac{x+1}{x+2} \neq 0\}$

So, we need $\frac{x+1}{x+2} \neq 0$ piece

$\frac{x+1}{x+2} = 0$

$x + 1 = 0$

$x \neq -1$ Throw it out, also.

$\mathcal{D}(f \circ g) = \mathbb{R} \setminus \{-1, -2\}$

Jan 16-11:57 AM

#s 37 - 40: Find $f \circ g \circ h$.

$f(\square) = \sqrt{\square} - 3$

39. $f(x) = \sqrt{x-3}$, $g(x) = x^2$, $h(x) = x^3 + 2$

$(f \circ g \circ h)(x) = f(g(h(x)))$

$= \sqrt{g(h(x)) - 3}$

$= \sqrt{(h(x))^2 - 3}$

$= \sqrt{(x^3+2)^2 - 3}$

#s 41 - 46 Express the function in the form $f \circ g$.

44. $G(x) = \sqrt[3]{\dfrac{x}{1+x}}$

$f \circ g$ f eats g

outside inside

$f(x) = \sqrt[3]{x}$

$g(x) = \dfrac{x}{1+x}$

#s 47-49 Express the function in the form $f \circ g \circ h$.

48. $H(x) = \sqrt{2 + |x|}$

50. Use the table to evaluate each expression.

(a) $f(g(1))$ (b) $g(f(1))$ (c) $f(f(1))$

(d) $g(g(1))$ (e) $(g \circ f)(3)$ (f) $(f \circ g)(6)$

x	1	2	3	4	5	6
$f(x)$	3	1	4	2	2	5
$g(x)$	6	3	2	1	2	3

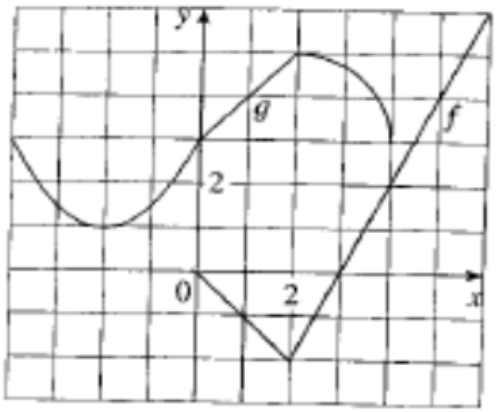
(a) $f(g(1))$

$= f(6) = 5.$

51. Use the given graphs of f and g to evaluate each expression, or explain why it is undefined.

(a) $f(g(2))$ (b) $g(f(0))$ (c) $(f \circ g)(0)$

(d) $(g \circ f)(6)$ (e) $(g \circ g)(-2)$ (f) $(f \circ f)(4)$



$f(g(2))$

$= f(5) = 4$

I wonder what I did with the data sets? Presumably, we're looking at the number of women as a function of the year. I *think* this was about careers in math, or something. I'll have to make something up.

Santa S 1.2 II skills.

1. **STAT-1** (Edit) Enter the values from the **Year** category into L_1 and the values from the **Women** category into L_2
2. **2nd-Y=-5** (Stat Plot Menu) By hitting **5**, we're assuring that Plots are ON.
3. **2nd-Y=-1** To set up Plot 1 (**2** to set up Plot 2, etc.) There are several items listed

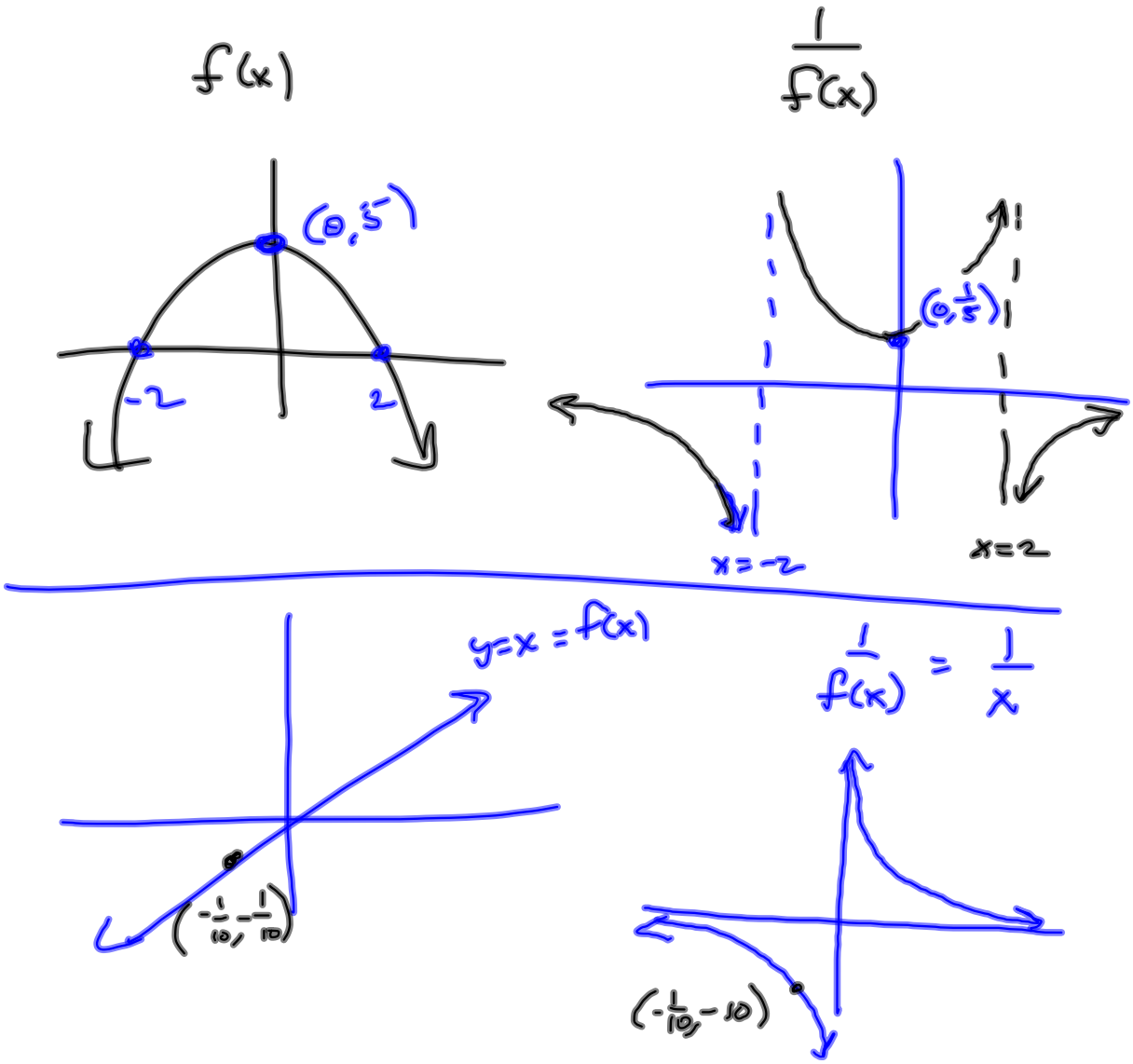
- **Type:** To select the sort of plot. The 1st selection is a scatter plot. The 2nd connects the dots.
- **Xlist:** Select L_1. This makes the **Year** category the independent variable
- **Ylist:** Select L_2. This makes the **Women** category the dependent variable
- **Mark:** Choose any of the three. Just use a DIFFERENT mark style for Plot 2, so that it's easy to see which plot is which later on.

4. **ZOOM-9** Zoom Stat. This automatically creates a viewing window that contains ALL the values listed.

To perform a linear regression (fitting a line to the data):

1. Stat-► Puts you in the Statistics CALC menu
2. **5** To build a regression line . You see LinReg(ax + b) in the main window.
3. **2nd-1-**, To enter L_1 as the independent variable
4. **2nd-2-,** To enter L_2 as the dependent variable
5. **2nd-Vars** To get the variables window, from which you select **1** (functions) and Y1 to put the regression line into your Y= window automatically. The TI-83 is slightly different.

Jan 14-11:46 AM


f(x)
(0, 5)
-2
2
1/f(x)
(0, 1/5)
x=-2
x=2
y=x=f(x)
(-1/10, -1/10)
1/f(x) = 1/x
(-1/10, -10)

Google online grapher.

A whole bunch of graphing utilities from this website.

http://www.zweigmedia.com/RealWorld/functions/func.html

In particular, for those interested in doing S 1.2 II assignment (optional), we have:

http://www.zweigmedia.com/RealWorld/newgraph/regressionframes.html

Lies My Calculator Told me:

http://www.stewartcalculus.com/data/default/upfiles/LiesCalcAndCompTold.pdf

Jan 18-12:57 PM