

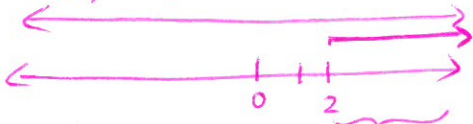
Lesson 2: Combining Functions Algebraically

Example 1: Use $f(x) = \sqrt{x-2}$ and $g(x) = x+1$.

- a) State the domain of $f(x)$ and of $g(x)$. $f(x)$ Domain $x \geq 2$ $g(x): x \in \mathbb{R}$
- b) Given that $m(x) = f(x) + g(x)$, write an explicit equation for $m(x)$, then determine its domain.
- c) Given that $p(x) = f(x) \cdot g(x)$, write an explicit equation for $p(x)$, then determine its domain.
- d) **OPTIONAL** Use graphing technology to graph $m(x)$ and $p(x)$, and use the graphs of each function to estimate the range of both functions.

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

$$m(x) = \sqrt{x-2} + x+1$$



Domain for $m(x)$ $x \geq 2$

c) $p(x) = f(x) \cdot g(x)$
 $= (\sqrt{x-2})(x+1)$

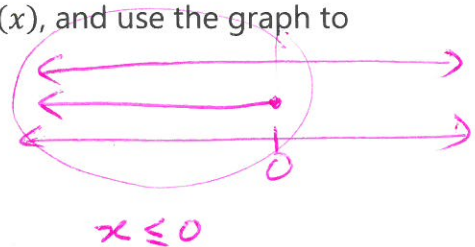
Domain for $p(x)$ $x \geq 2$

Example 2: Use $f(x) = \sqrt{-x}$ and $g(x) = (x+2)^2$.

- a) State the domain of $f(x)$ and of $g(x)$.
- b) Given that $q(x) = \frac{f(x)}{g(x)}$, write an explicit equation for $q(x)$, then determine its domain.
- c) **OPTIONAL** Use graphing technology to graph $q(x)$, and use the graph to estimate the range of the function.

a) $f(x): (-\infty, 0]$ or $x \leq 0$

$g(x): (-\infty, \infty)$ or $x \in \mathbb{R}$.



b) $q(x) = \frac{f(x)}{g(x)}$

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

$q(x)$ the domain $x \leq 0$ or $(-\infty, 0]$

Example 3: Consider the function: $m(x) = 2x^2 + 3x - 7$.

- a) Write explicit equations for three functions $f(x)$, $g(x)$, and $n(x)$ so that $m(x) = f(x) + g(x) + n(x)$.
- b) Write explicit equations for two functions $f(x)$ and $g(x)$ so that $m(x) = f(x) - g(x)$.

$$a) \quad f(x) = 2x^2 \quad g(x) = 3x \quad n(x) = -7$$

$$b) \quad m(x) = 2x^2 + 3x - 7 \quad \begin{array}{l} f(x) = 2x^2 + 3x \\ g(x) = 7 \end{array}$$

Example 4: Consider the function: $p(x) = x^2 - 2x - 15$.

- a) Write explicit equations for two functions $f(x)$, $g(x)$, so that $p(x) = f(x) \cdot g(x)$.
- b) Given that $q(x) = x + 3$, write explicit equations for two functions $f(x)$ and $g(x)$ so that $q(x) = \frac{f(x)}{g(x)}$.

$$a) \quad p(x) = f(x) \cdot g(x) \quad \begin{array}{l} f(x) = x - 5 \\ g(x) = x + 3 \end{array}$$

$$x^2 - 2x - 15 = (x - 5)(x + 3)$$

$$b) \quad q(x) = \frac{f(x)}{g(x)}$$

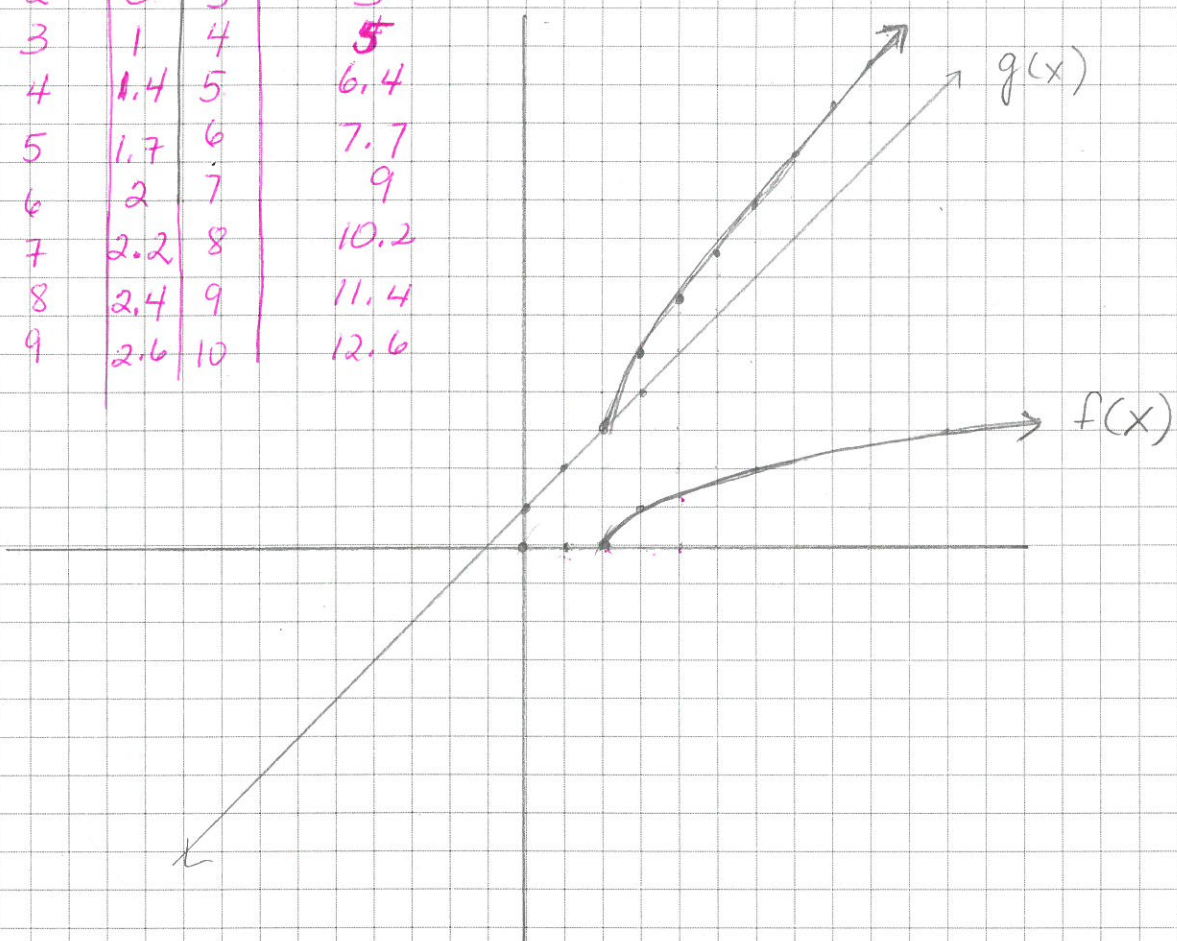
$$x + 3 = \frac{(x - 1)(x + 3)}{(x - 1)}$$

Assignment Time! Work on p.278- 3 - 11 (not 5b), MC 1&2

Example #1

$$m(x) = \sqrt{x-2} + x+1$$

x	f(x)	g(x)	f(x)+g(x)
2	0	3	3
3	1	4	5
4	1.4	5	6.4
5	1.7	6	7.7
6	2	7	9
7	2.2	8	10.2
8	2.4	9	11.4
9	2.6	10	12.6



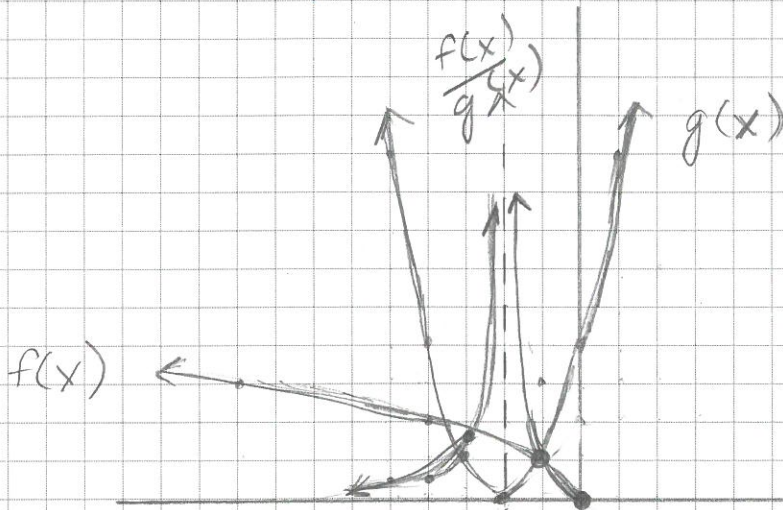
$$m(x) = f(x) + g(x) = (f+g)(x)$$



Example #2

$$g(x) = \frac{f(x)}{g(x)}$$

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



x	f(x)	g(x)	$\frac{f(x)}{g(x)}$ ↓
0	0	4	0
-1	1	1	1
-2	$\sqrt{2}$	0	Undefined
-3	$\sqrt{3}$	1	$\sqrt{3}$
-4	2	4	0.5
-5	$\sqrt{5}$	9	0.24
-6	$\sqrt{6}$	16	0.15