Unit 7: Combinations of Functions

Sums & Differences of Functions

Sum: $$h(x) = f(x) + g(x)$$

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

"f plus g of x"

Difference: $$(f-g)(x) = f(x) - g(x)$$

"f minus g of x"

To graph, pick an x-value and determine y-values for each function, then add or subtract the y-values.

Algebraically, combine the two functions, simplifying where possible.

$$(f+g)(0) = f(0) + g(0)$$

y-value of f when $x=0$

y-value of g when $x=0$

Functions can only be combined for x-values which are valid for both functions. This is where the domains of both functions overlap, which is called the intersection of the domains.

$$D_{f+g} = D_f \cap D_g$$

$\cap$ → "intersection"

Ex.1 Given $f = \{(1,3),(2,-5),(3,7)\}$

$g = \{(2,-2),(3,3),(4,1)\}$

(a) determine the domain of each function.
(b) determine the domain of $f+g$.
(c) determine $f+g$.

(a) $D_f = \{1,2,3\}$ $D_g = \{2,3,4\}$

(b) $D_{f+g} = \{2,3\}$

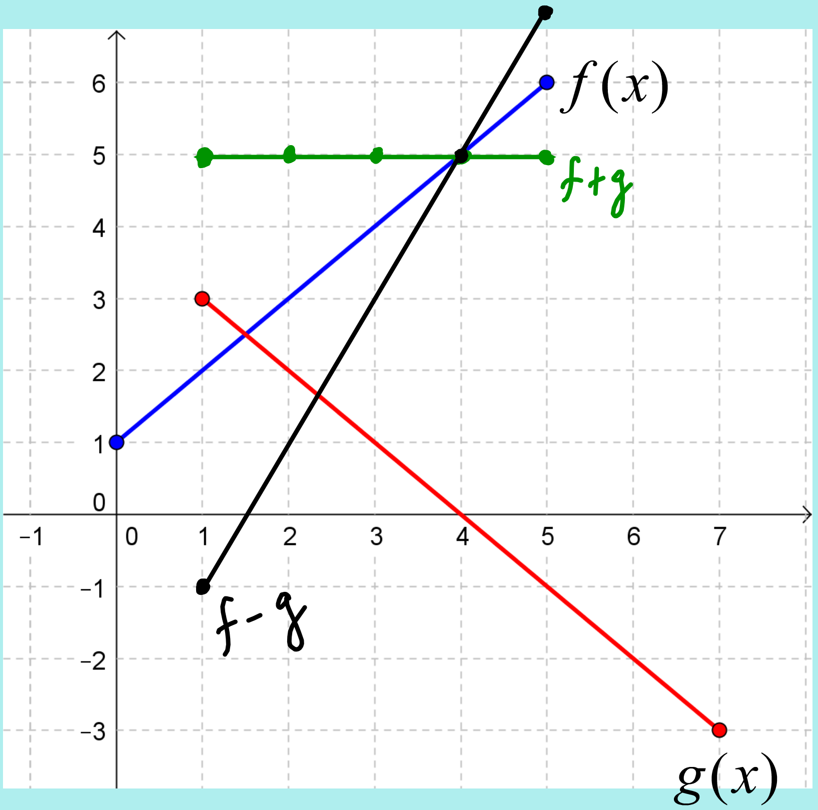
(c) $f+g = \{(2,-7),(3,10)\}$

$y_f + y_g$ for $x=2$

$y_f + y_g$ for $x=3$

Graph $f + g$ and $f - g$.

$6-(-1)=7$



domains?

$D_f: x \in [0,5]$

$D_g: x \in [1,7]$

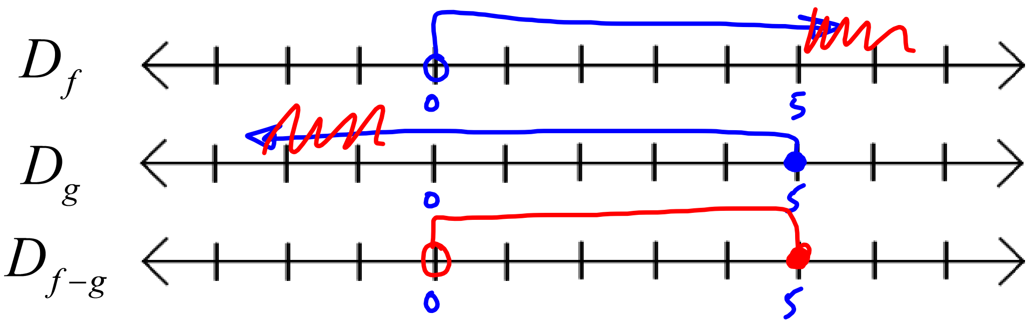
$D_{f+g}: x \in [1,5]$

$D_{f-g}: x \in [1,5]$

Ex.2 Given $D_f = \{x \in \mathbb{R} \mid x > 0\}$

$D_g = \{x \in \mathbb{R} \mid x \leq 5\}$

(a) represent each domain on a number line.
(b) represent the domain of $f - g$ on the same line.



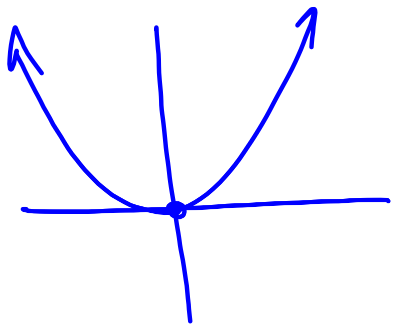
(c) represent the domain of $f - g$ using set notation.

$D_{f-g} = \{x \in \mathbb{R} \mid 0 < x \leq 5\}$

Recall:

(1) An <u>even function</u> has reflective symmetry with respect to the y-axis.

$$f(x) = f(-x)$$

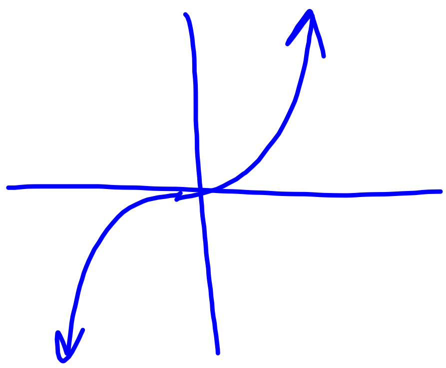


(2) An <u>odd function</u> has rotational symmetry with respect to the origin.

$$f(x) = -f(-x)$$

or

$$-f(x) = f(-x)$$



Assigned Work:

p.528 # 1ace, 2, 3, 5, 7, 9acef, 10, 11