Operations with Functions

Sept 22/2014

Two functions with the same domain can be added, subtracted, or multiplied to create a new function. The new function will have the same domain, but other properties may change.

(1) Given a graph, or points, match x-values and perform the arithmetic operation on the y-values.

(2) Given an equation, apply the operation algebraically, and simplify where possible.

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Recall:

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

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

(2) An odd function has rotational symmetry with respect to the origin.

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

or

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

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Ex.1 Combinations of even functions

Given the even functions $f(x)$ and $g(x)$, determine the symmetry, if any, of:

(a) $h(x) = af(x)$

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

(c) $h(x) = f(x) - g(x)$

(d) $h(x) = f(x) \times g(x)$

Ex.2 Repeat for two odd functions.

Ex.3 Repeat for one even and one odd function.
(does order matter for part c?)

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Ex. 3 (b) $h(x) = f(x) + g(x)$

f: even, $f(x) = f(-x)$

g: odd, $g(x) = -g(-x)$ or $-g(x) = g(-x)$

test $h(x)$ even:

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

$= f(x) + [-g(x)]$

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

$\neq h(x)$ $\therefore$ not even

test $h(x)$ odd: $h(x) = -h(-x)$

$-h(-x) = -1[f(x) - g(x)]$

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

$\neq h(x)$ $\therefore$ not odd

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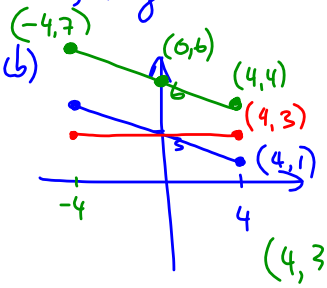
Assigned Work:

p.57 # 2, 3, 4, 5, 6

2. $f+g$

given graphs (points) → match x-values and operate on y-values

(b)



$(4, 3+1)$

$= (4,4)$

OR equation for each

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

$g(x) = 3$

$f+g = -\frac{1}{3}x + 6$

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3(b) domains do not match

⟹ disregard $g(x)$ for interval $(3, 4]$

⟹ use interval $[-4, 3]$ for $f-g$

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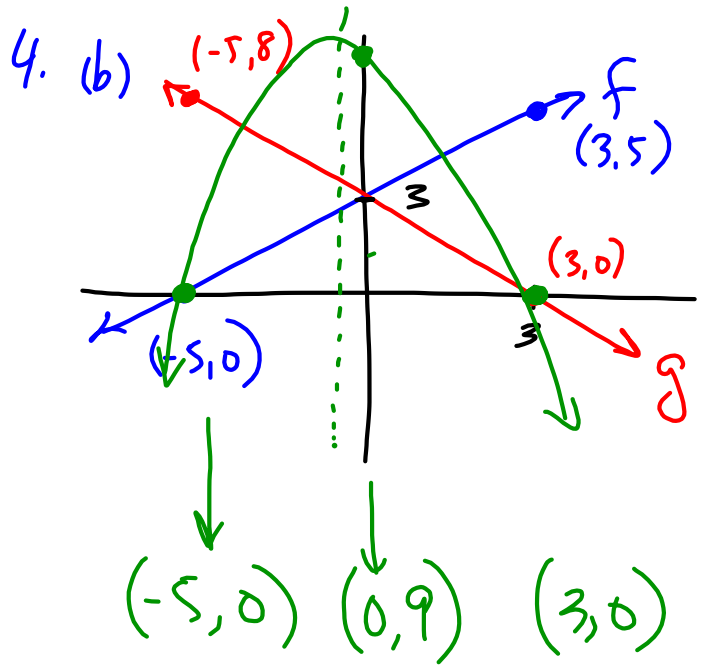
4. (b)



(-5, 0) (0, 9) (3, 0)

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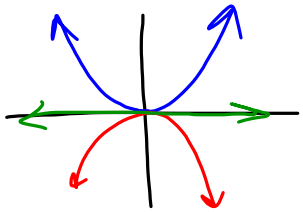
5. (a) $h(x) = f(x) + g(x)$

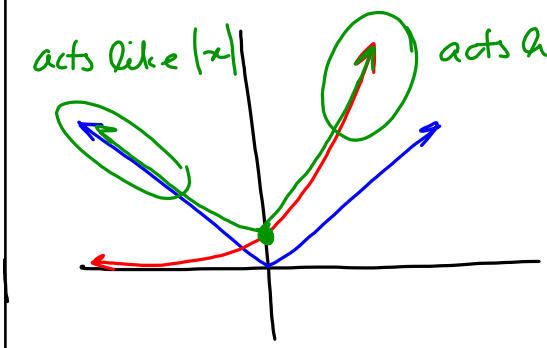
$= x^2 + (-x^2)$

$= 0$



(c) $r(x) = |x| + 2^x$

acts like $|x|$ acts like 2^x



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