Math 30, Homework 2 on sections 1.3, 1.6, 1.7

Write all your working out and answers on your own notepaper - no need to write the questions. Please use lots of space.

It is very important that you show clearly any work you had to do to get your answers. Just writing the answer down with no work shown is usually not enough. All 15 questions are worth 2 points each. Hand in your solutions next week only.

Do these first 10 questions and *check that your answers match the solutions on pages 3 and 4*. If you don't get the same answers then look at your notes or the book or ask me. Only do the last five questions when you are sure you understand the first ten.

(1) Decide if these functions are even, odd or neither:

    (a) $f(x) = 6x$

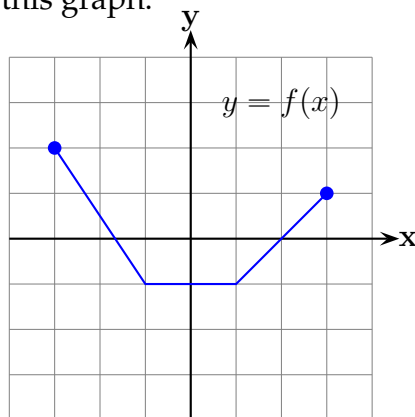   **(b)** $g(x) = x^3 + 5$

    (c) $h(x) = \sqrt{1 + x^2}$

(2) Define the piecewise function $f(x) = \begin{cases} x + 2 & \text{if } x \geq 3 \\ x - 2 & \text{if } x < 3 \end{cases}$ and find the following:

    (a) $f(0)$

    (b) $f(3)$

    (c) $f(100)$

(3) Suppose the function $f(x)$ has this graph:

Draw the graph of the new function $f(x) + 2$.

(4) For the function $f(x)$ in question 3, draw the graph of the new function $-f(x)$.

(5) For the function $f(x)$ in question 3, draw the graph of the new function $2f(x + 1)$.

(6) Starting with the parabola $y = x^2$, use transformations of this graph to find the graph of $y = -(x-1)^2 - 2$. (Hint: first draw $y = (x-1)^2$.)

(7) Find the domain of these functions:

    (a) $f(x) = \dfrac{2}{x+4}$

    (b) $g(x) = x^2 + 3x - 1$

    (c) $h(x) = \dfrac{\sqrt{x+4}}{x+1}$

(8) For the functions $f(x) = 2x - 1$ and $g(x) = x^2 + 1$, compute and simplify the new functions

    (a) $f - g$

    (b) fg

(9) For the functions $f(x) = 2x - 1$ and $g(x) = x^2 + 1$, compute and simplify the new functions

    (a) $f \circ g$

    (b) $g \circ f$

(10) Let $h(x) = \sqrt{x-1}$ and $k(x) = \dfrac{1}{x+2}$.

    (a) Compute $k \circ h$

    (b) Find the domain of $k \circ h$

Five more questions. Show clearly all your working out and reasoning.

(11) Define the piecewise function $f(x) = \begin{cases} x^2 & \text{if } x < -1 \\ x & \text{if } -1 \leq x < 3 \\ \sqrt{x} & \text{if } 3 \leq x \end{cases}$ and find the following:

    (a) $f(-4)$

    (b) $f(2)$

    (c) $f(4)$

(12) Suppose the function $f(x)$ has this graph:
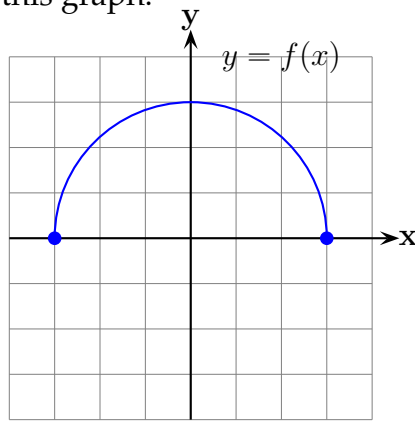
Draw the graph of the new function $\dfrac{1}{3}f(x-1)+2$.

(13) Find the domain of these functions:

(a) $f(x) = \sqrt{x} - \sqrt{x-1}$

(b) $g(x) = x + \dfrac{1}{x} + \dfrac{10}{x+10}$

(c) $h(x) = \sqrt{1+x^2}$

(14) For the functions $f(x) = 3x$ and $g(x) = x^2 - x + 2$, compute and simplify the new functions

(a) $f - g$

(b) fg

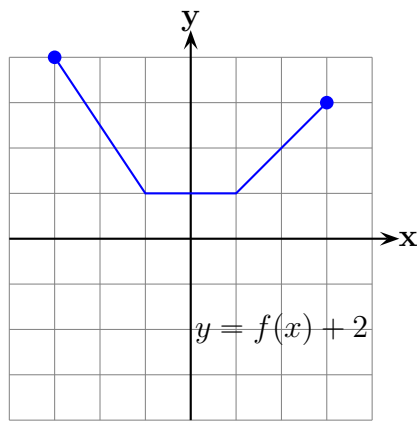**(15)** For the functions $f(x) = 3x$ and $g(x) = x^2 - x + 2$, compute and simplify the new functions
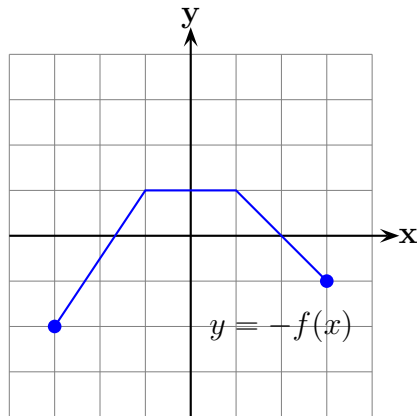
(a) $f \circ g$

(b) $g \circ f$

Answers to questions (1)-(10):

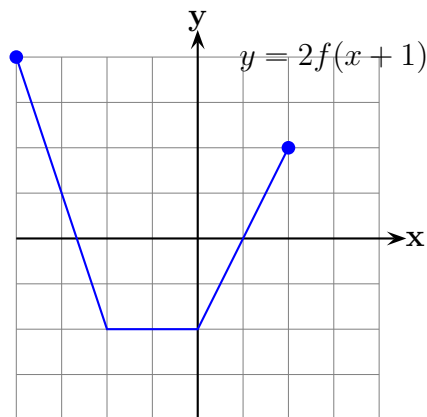*(1) (a)* odd, *(b)* neither even nor odd, *(c)* even.

(2) (a) $f(0) = -2$, *(b)* $f(3) = 5$, *(c)* $f(100) = 102$.

$$y = f(x) + 2$$

(3)

$$y = -f(x)$$

(4)

$$y = 2f(x + 1)$$

(5)

(6) Use these three transformations of the graph of $y = x^2$: first move it right 1 unit, then reflect it through the x-axis and finally move it down 2 units. Your picture should be an "n" shaped parabola with top point at $(1, -2)$.

(7) *(a)* domain is $(-\infty, -4) \cup (-4, \infty)$,   *(b)* domain is $(-\infty, \infty)$,
(c) domain is $[-4, -1) \cup (-1, \infty)$.

(8) *(a)* $(f - g)(x) = -x^2 + 2x - 2$,   *(b)* $(fg)(x) = 2x^3 - x^2 + 2x - 1$

(9) *(a)* $(f \circ g)(x) = 2x^2 + 1$,   *(b)* $(g \circ f)(x) = 4x^2 - 4x + 2$

(10) *(a)* $(k \circ h)(x) = \dfrac{1}{\sqrt{x - 1} + 2}$,   *(b)* domain is $[1, \infty)$

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