8th lesson

https://www2.karlin.mff.cuni.cz/ kuncova/en/teachMat1.php
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Exercises

1. Look at function $h(x)$ (the pink one)
   `https://www.geogebra.org/calculator/q6sspc9y`
   Sketch

   (a) $\frac{h(x)}{2}$ (b) $3h(x)$ (c) $-2h(x)$

2. Look at function $f(x)$ (the pink one)
   `https://www.geogebra.org/calculator/rcd6wsup`
   Sketch

   (a) $f(x+1)$ (b) $f(x-1)$ (c) $f(x)+1$ (d) $f(x)-1$

3. Look at function $g(x)$ (the pink one)
   `https://www.geogebra.org/calculator/jxfhwxca`
   Sketch

   (a) $|g(x)|$ (b) $g(|x|)$ (c) $-g(|x|)$ (d) $g(-|x|)$

4. Let $f(x) = x^2$ and $g(x) = x - 2$. Find

   (a) $f(g(3))$ (b) $g(f(3))$ (c) $f(g(x))$ (d) $g(f(x))$

5. Let $f(x) = 4 - x^2$ and $g(x) = \sqrt{x}$. Find

   (a) $f(g(x))$ (b) $g(f(x))$

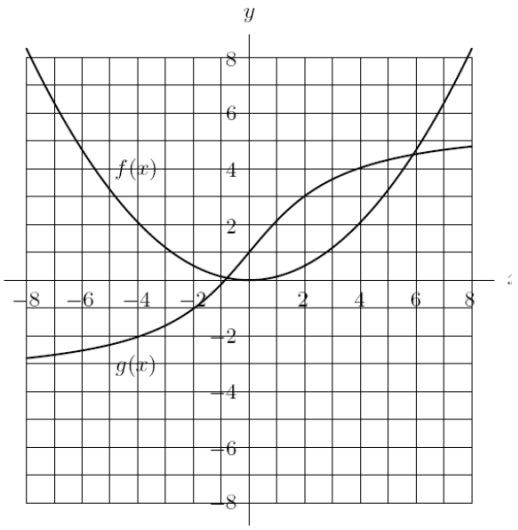
6. Let $f(x) = 3x - 8$ and $g(x) = \frac{x+8}{3}$. Find

   (a) $f(g(x))$ (b) $g(f(x))$

7. Express the following functions as composition:

   (a) $(1 + x^3)^{27}$ (b) e^{-x^2} (c) $-(e^x)^2$

8. Find $g(f(3))$, if the f and g are at the picture:



9. The values of functions f and g can be found in the table. Find $f(g(0))$.

x	-2	-1	0	1	2
$f(x)$	1	0	-2	2	-1
$g(x)$	-1	1	2	0	-2

10. The values of functions f and g can be found in the table. Find x, if $f(g(x)) = 1$.

x	-2	-1	0	1	2
$f(x)$	1	0	-2	2	-1
$g(x)$	-1	1	2	0	-2

11. Let $f(x) = x^2$. Find the image of the sets

    (a) $\{2\}$
    (b) $\{-3, 0, 1, 10\}$
    (c) $(-1, 0)$
    (d) $[-2, 2]$
    (e) $(-2, 3]$
    (f) $(-2, \infty)$

12. Let $f(x) = x^2$. Find the preimage of the sets

    (a) $\{4\}$
    (b) $(0, 9)$
    (c) $[0, 9)$
    (d) $[1, 9]$
    (e) $(-2, \infty)$
    (f) $\{-4\}$

13. Let $f(x) = \sin x$. Find the preimage of the sets

(a) $\{1\}$
(b) $(-1, 1)$
(c) $[0, 1)$
(d) $(-2, -1]$
(e) $(-\infty, -3]$

14. Find (or sketch) a function which maps

(a) $[0; 1]$ onto $[0; 2]$
(b) $[0; \frac{\pi}{2})$ onto $[0; \infty)$
(c) $(-\frac{\pi}{2}; \frac{\pi}{2})$ onto $(-\infty; \infty)$
(d) $(0; 1)$ onto $[0; 1]$
(e) $[a; b]$ onto $[0; 1]$