MATH 161 — Precalculus[1]
Community College of Philadelphia

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Math 161 — Chapter 5
Class Exercises

1. Use a computer or graphing calculator to graph the following functions and give the domain and range of the function:

   (a) $f_1(x) = \sqrt{9x}$
   (b) $f_2(x) = \sqrt{x+9}$
   (c) $f_3(x) = \sqrt{x}+9$
   (d) $f_4(x) = \sqrt{-9x}$
   (e) $f_5(x) = 9\sqrt{x}$
   (f) $f_6(x) = -\sqrt{9x}$
   (g) $f_7(x) = \sqrt{x+2}+9$
   (h) $f_8(x) = \sqrt{-5x+2}-5$
   (i) $g_1(x) = |3x|$
   (j) $g_2(x) = |x+3|$
   (k) $g_3(x) = |x|+3$
   (l) $g_4(x) = |3|+x$
   (m) $g_5(x) = 3|x|$
   (n) $g_6(x) = |-x|-5$
   (o) $g_7(x) = 2|2x+3|-9$

2. For each set of conditions, give an example of a square root function (that is, a function of the form $f(x) = a\sqrt{bx+c}+d$) satisfying the conditions, where possible. If not possible, explain why not.

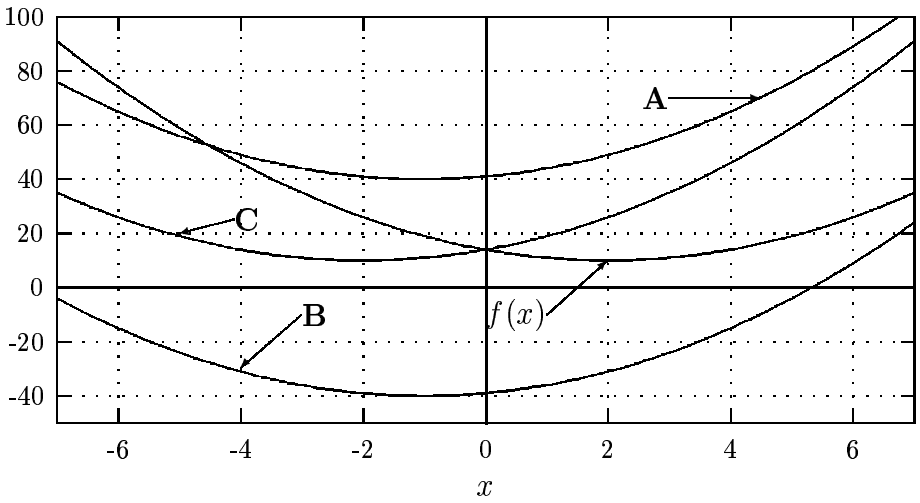
   (a) Domain is $[1,\infty)$, range is $[2,\infty)$
   (b) $f(1) = 0$ and range is $(-\infty, 1]$
   (c) Domain is $(-\infty,\infty)$, range is $[0,\infty)$

3. For each set of conditions, give an example of an absolute value function (that is, function of the form $f(x) = a|bx+c|+d$) satisfying the conditions, where possible. If not possible, explain why not.

   (a) Domain is $(-\infty,\infty)$, range is $[-7,\infty)$
   (b) Domain is $[6,10]$, range is $(-\infty,\infty)$
   (c) $f(5) = -3$ and $f(0) = 2$

4. The graph below includes plots of four quadratic functions.

Problem 4



The four functions are given below. Match the functions with the label of the appropriate graph.

$$\begin{aligned} f(x) &= (x-2)^2 + 10 \\ g(x) &= (x+2)^2 + 10 \\ h(x) &= (x+1)^2 + 40 \\ i(x) &= (x+1)^2 - 40 \end{aligned}$$

5. Give the vertex of each parabola above.

6. Each of the quadratics graphed above is a translation of $f(x) = x^2$. Describe the translation (that is, how many units the original graph is moved horizontally and vertically in each case).

7. On a single coordinate system, sketch the graph of each of the following functions:

   (a) $f(x) = x^2$

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

   (c) $h(x) = (x-3)^2 + 2$

8. On a single coordinate system, sketch the graph of each of the following functions:

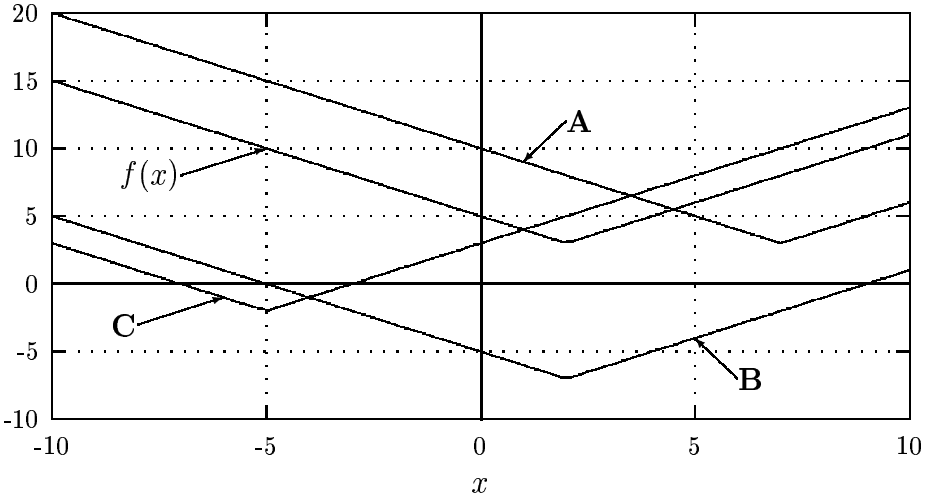
(a) $f(x) = x^2$

(b) $g(x) = .5x^2$

(c) $h(x) = 2x^2$

9. The graph below includes plots of four absolute value functions.

Problem 9



The four functions are given below. Match the functions with the label of the appropriate graph.

$$\begin{aligned} f(x) &= |x-2|+3 \\ g(x) &= |x-7|+3 \\ h(x) &= |x-2|-7 \\ i(x) &= |x+5|-2 \end{aligned}$$

10. On a single coordinate system, sketch the graph of each of the following functions:

(a) $f(x) = |x|$

(b) $g(x) = |x-3|+2$

(c) $h(x) = |x+5|-4$

11. Describe the translation that gives each of the graphs above starting from $y = |x|$.

12. On a single coordinate system, sketch the graph of each of the following functions:

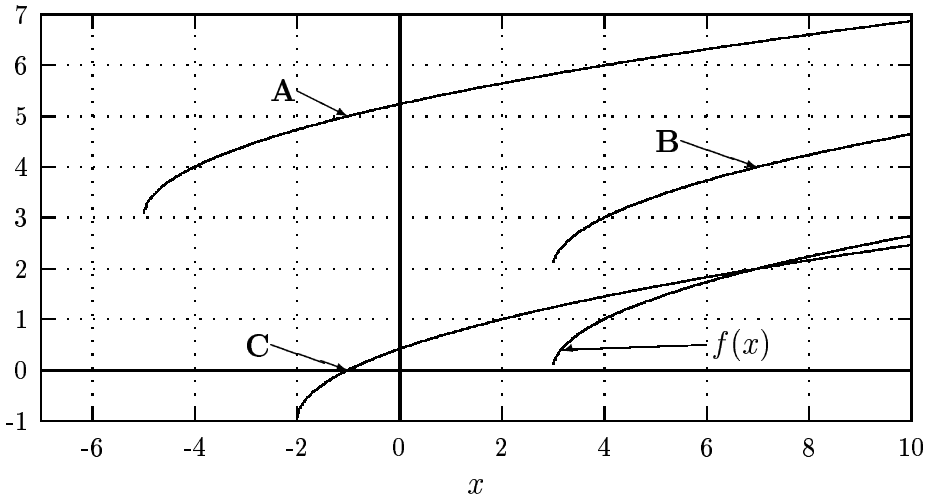
    (a) $f(x) = |x|$

    (b) $g(x) = .5|x|$

    (c) $h(x) = 2|x|$

13. The graph below includes plots of four square-root functions.

Problem 13



The four functions are given below. Match the functions with the label of the appropriate graph.

$$\begin{aligned} f(x) &= \sqrt{x-3} \\ g(x) &= \sqrt{x-3}+2 \\ h(x) &= \sqrt{x+2}-1 \\ i(x) &= \sqrt{x+5}+3 \end{aligned}$$

14. For each function above, describe the translation of $y = \sqrt{x}$ that gives it.

15. On a single coordinate system, sketch the graph of each of the following functions:

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

(b) $g(x) = \sqrt{x-2}$

(c) $h(x) = \sqrt{x+3} - 2$

16. The function $f(x) = |x|$ is plotted on the graph below, along with three functions that are simple translations of the function f.

(a) Give the formula for the function a.

(b) Give the formula for the function b.

(c) Give the formula for the function c.

Problem 16