Math 75 Worksheet 1 Solutions
Section 1.1

Part 1.

For problems 1 through 5, determine the domain of each function.

1. $f(x) = \dfrac{1}{x^2+1}$ Domain: $\mathbb{R}$ (all real numbers)
2. $f(x) = \dfrac{1}{x^2-1}$ Domain: $x \neq \pm 1$
3. $f(x) = \dfrac{1}{x^3+1}$ Domain: $x \neq -1$
4. $f(x) = \dfrac{1}{\sqrt{x+1}}$ Domain: $x > -1$
5. The population of ants in an ant farm t months after July 1.

   Domain: $t \geq 0$

   For problems 6 through 8, determine the domain and range of each function.

6. Dr. Jasquirt's chemistry quiz has 5 points possible. Dr. Jasquirt does not award fractions of points. The grade for each score is as follows:

Score	Grade
5	A
4	B
3	C
2	D
1	F
0	F

Domain: $\{0, 1, 2, 3, 4, 5\}$

Range: {A, B, C, D, F}

Note that $[0, 5]$ is not correct for the domain, since fractions of points are not possible. Also, $[A, F]$ does not have meaning in mathematics—it is better to write out each member of the set, as above.

7. (Refer to your worksheet for the graph) Domain: $-3.5 < x \leq 1.5$, $\{3\}$

   Range: $-1 < y \leq 2$

8. (Refer to your worksheet for the graph) Domain: $\mathbb{R}$

   Range: $y > -4$

Part 2.

Write each function as a piecewise function and then graph the function, as in the sample. (Refer to your worksheet for the sample) **The graphs are on the next page.**

1. $f(x) = |x-2|$

$$f(x) = |x-2| = \begin{cases} x-2 & x \geq 2 \\ -x+2 & x < 2 \end{cases}$$

2. $f(x) = |x| + 3$

$$f(x) = |x| + 3 = \begin{cases} x+3 & x \geq 0 \\ -x+3 & x < 0 \end{cases}$$

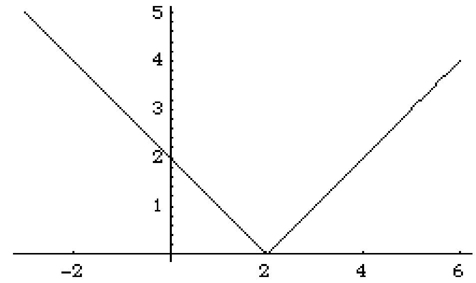
3. $f(x) = |2x|$

$$f(x) = |2x| = \begin{cases} 2x & x \geq 0 \\ -2x & x < 0 \end{cases}$$

4. $f(x) = |2x+1| - 4$

$$f(x) = |2x+1| - 4 = \begin{cases} 2x-3 & x \geq -\frac{1}{2} \\ -2x-5 & x < -\frac{1}{2} \end{cases}$$

Notice that in each problem, $|\clubsuit| = \clubsuit$ for $\clubsuit \geq 0$ and $|\clubsuit| = -\clubsuit$ for $\clubsuit < 0$. You may set up the piecewise function this way first, then solve the inequalities $\clubsuit \geq 0$ and $\clubsuit < 0$ for x. For example, in #4 above we know that if $2x+1$ is *positive or 0*, then it will be **equal** to its absolute value. Solve the inequality $2x+1 \geq 0$ for x; you should find that it holds for $x \geq -\frac{1}{2}$. Similarly, if $2x+1$ is *negative*, then since its absolute value is always *positive*, $|2x+1|$ will be the **opposite** of $2x+1$. The inequality $2x+1 < 0$ holds for $x < -\frac{1}{2}$, so that is what we write for the other piece of the piecewise function.



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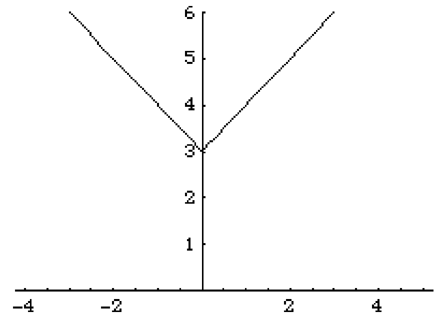

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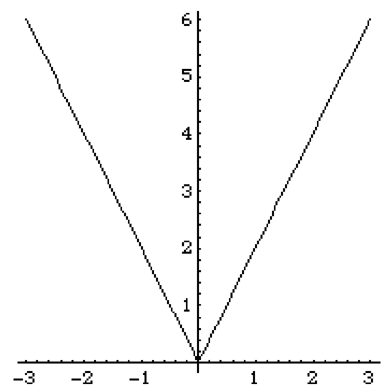

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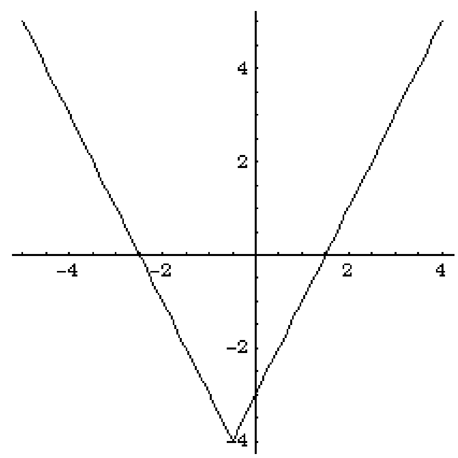

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