Worksheet 4 – absolute value, square roots, and inequalities

If you had trouble with question 4a or 4b, do these problems.

1. Graph the function $f(x) = |x - 2|$ and then solve the inequality $|x - 2| < 1$.

   Method 1: The function $|x - a|$ measures how far away $x$ is from $a$. Use your graph or a number line to solve the inequality.

   Method 2: $|x - a| < b$ is the same as $-b < x - a < b$. (Prove this to yourself.) Solve to get $a - b < x < a + b$.

2. Solve these inequalities for $x$.
   (a) $|x - 3| < 4$
   (b) $\left| \frac{x - 3}{2} \right| < 1$
   (c) $\left| \frac{x - 1}{4} \right| < 1$
   (d) $|4(x - 1)| < 1$

3. Solve the following inequalities for $x$:
   (a) $1/x < 4$
   (b) $-x < 1$
   (c) $\sqrt{x} < 4$ Careful – what is the domain of $\sqrt{x}$?
   (d) $\sqrt{x} > 4$
   (e) $\frac{1}{\sqrt{x}} < 4$
   (f) $\ln(x) < 1$

4. For which values of $x$ does $\sqrt{x^2} = x$? True or False: $\sqrt{x^2} = |x|$ for all $x$.

5. Solve $\sqrt{4 - x^2} < 1$.

6. Suppose that $x$ is in the interval $[0, 1/10]$, and $y$ is between $x$ and 0. What is the largest that $x^2y^3$ can be?