# Absolute Value Equations

1. Warm up, to remind yourself how absolute value bars work. Evaluate each of these expressions.

   a) $|-4-7|$ b) $-|4-7|$ c) $|7-4|+3$ d) $3-6\left|-1+(3-5)^3\right|$

2. Solve each of these equations. These are the simplest kind of absolute value equation, in the form |linear expression| = constant.

   a) $|x-8|=7$ b) $|t+3|=12$

   c) $|4x-5|=22$ d) $|3q+4|=3$

   e) $|17-x|=1$ f) $|5-2x|=10$

3. Solve each of these equations. These equations have a little more going on with them, but the same basic strategy applies. You may consider multiple simpler equations where the absolute value bars are either simply omitted, or replaced by negation. Be sure to check all possible solution.

   a) $|x-8| = x$

   b) $|z+3|+8 = 12$

   c) $|4x-5| = |2x-3|$

   d) $|1-x| = |2x-1|$

4. In statistics, you learn about things called "confidence intervals". For example, think about the question "what percent of the US population supports a government-run universal healthcare option?" It's not really possible to actually know the exact answer to that. But instead of asking about the entire population, we might sample a "small" group of people and see how they feel. We could sample 200 people, and find that 76% support that.

   It would be dishonest to say that 76% of the population supports a government-run universal healthcare option, because maybe these 200 people had views that are not representative of the full population. In statistics, you learn how to turn this situation into the following equation:

   $$|p-0.76| = 0.06$$

   The solutions to this equation are a low-end estimate for the population proportion, and a high-end estimate. Solve this equation and write a conclusion statement.