San José State University
Fall 2015
Math-8: College Algebra
Section 03: MW noon–1:15pm
Section 05: MW 4:30–5:45pm

Quiz #8

Closed book and notes, and no calculators. Show all work for full credit.

1. A function maps a set of independent values called the **domain** to a set of dependent values called the **codomain**. The subset of the codomain actually used is called the **range**.

2. What are the two requirements for values in the domain of a function?

1. All values must be used.
2. Each value must map to exactly one value in the codomain/range.

3. Solve for x, giving your answer in interval notation.

First, we need to get the inequality in $|x - a| < b$ form:

$$\begin{aligned} 2|5-3x|+7 &< 21 \\ 2|5-3x] &< 14 \\ |5-3x| &< 7 \end{aligned}$$

Now, since this is a less-than inequality, we use a 3-way expression:

$$\begin{aligned} -7 < 5 - 3x < 7 \\ -12 < -3x < 2 \\ 4 > x > -\frac{2}{3} \\ -\frac{2}{3} < x < 4 \end{aligned}$$

Note that we turn around the inequality when we divide by -3. Thus, the final solution in interval notation is: $(-\frac{2}{3}, 4)$.

4. You start a side-business manufacturing widgets. The variable costs are \$2 per widget. The fixed costs are \$500 per month. You would like to keep your monthly costs between

\$1000 and \$2000 per month. What are the minimum and maximum number of widgets that you can make per month?

First, we build a cost function using the variable and fixed costs:

$$C(x) = 2x + 500$$

Now, we build a 3-way inequality and solve:

$$\begin{aligned} 1000 \leq C(x) &\leq 2000 \\ 1000 \leq 2x + 500 &\leq 2000 \\ 500 \leq 2x &\leq 1500 \\ 250 \leq x &\leq 750 \end{aligned}$$

Thus, the minimum is 250 widgets and the maximum is 750 widgets.

5. Determine the domain of the following function:

$$f(x) = \frac{x-5}{\sqrt{x^2-9}}$$

The $x - 5$ in the numerator is not under the square root and thus has no affect on the domain. Remember, the numerator can be 0. But, the denominator may not be 0 and the radicand under the square root must be positive. Thus, we have:

$$\begin{aligned} x^2 - 9 &> 0 \\ (x+3)(x-3) &> 0 \end{aligned}$$

which results in the critical points: ± 3. Picking test values, we can build a sign table as follows:

	$(x+3)$	$(x-3)$	
-4	-	-	+
0	+	-	-
4	+	+	+

Thus, the final domain is: $(-\infty, -3) \cup (3, \infty)$.