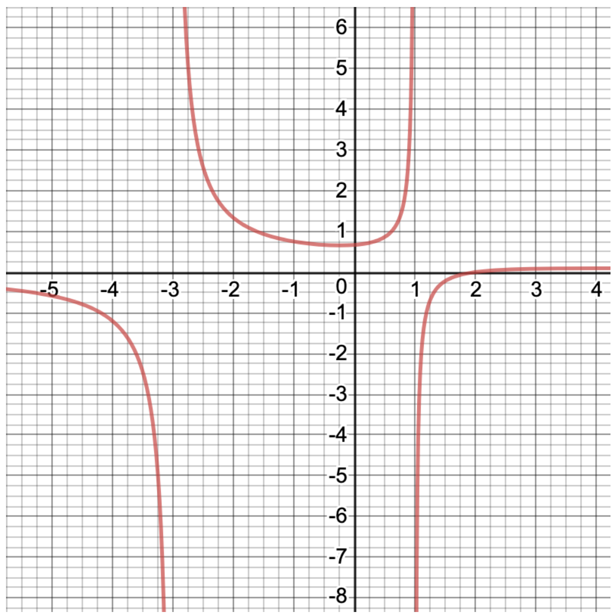
Mathematics 1375/OL79, Fall 2020 **Exam #1**
Instructor: Suman Ganguli **Due: Sunday, October 11** **Name:** ____________________

Question:	1	2	3	4	5	Total
Points:	10	10	10	10	10	50
Score:						

In order to receive full credit, you must **show all your work** and simplify your answers. Submit your written solutions by the end of the day Sunday on Blackboard (look for the "Exam #1" Assignment). Please **scan your written answers to a single pdf file**.

1. (10 points) Shown is the graph of the function $f(x) = \dfrac{x-2}{x^2+2x-3}$:



(a) Compute the following values of f (show your calculations), and **label the corresponding points with their coordinates** on the graph above:

- $f(0) =$
- $f(2) =$
- $f(-4) =$

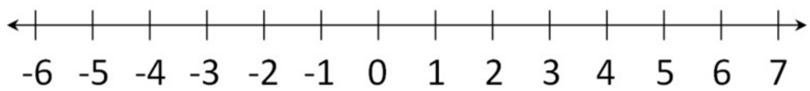
(b) What is the domain of f? For full credit, show your work, and write the solution in interval notation. (Hint: Start by factoring the denominator.)

(c) Briefly describe what happens to the graph of the function near the points which are *not* in the domain.

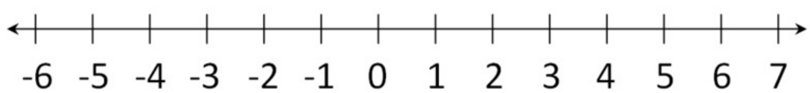
2. (10 points) Solve each of the following inequalities algebraically, and

- write the solution set in interval notation
- graph the solution set on the given number line

(a) $|3 - 2x| > 7$



(b) $|4x - 3| \leq 5$



3. (10 points) We discussed in class that we can interpret $|x|$ as the distance of x from 0.

(a) Hence, the solution set of the inequality $|x| < d$ should correspond to the set of numbers less than distance d from 0. What is the solution set of $|x| < d$ in interval notation?

(b) Now solve the inequality $|x - a| < d$ (for arbitrary constants a and d). Write the solution set in interval notation.

(c) Sketch the solution set from (b) on a number line, and then verbally describe the solution set in terms of distance d and the point a.

4. (10 points) Write down **and simplify** the following for $g(x) = x^2 - 7x - 20$:

   (a) $g(x+h) =$

   (b) $g(x+h) - g(x) =$

   (c) $\dfrac{g(x+h) - g(x)}{h} =$

5. (10 points) Let $f(x) = 4x - 1$ and $g(x) = \sqrt{x}$. Write down and simplify expressions for the following functions, and find their respective domains.

   (a) $\left(\dfrac{f}{g}\right)(x) =$

   domain of $\left(\dfrac{f}{g}\right)$:

   (b) $\left(\dfrac{g}{f}\right)(x) =$

   domain of $\left(\dfrac{g}{f}\right)$:

   (c) $(f \circ g)(x) =$

   domain of $(f \circ g)$:

   (d) $(g \circ f)(x) =$

   domain of $(g \circ f)$: