

# Math 121 – Quiz 3 Solution

1. Consider the rational function:

$$R(x) = \frac{3x}{x^2 - 1}$$

- (a) What is the domain of  $R(x)$ ?
  - (b) Find all  $x$ -intercepts.
  - (c) Find all vertical asymptotes, if any.
  - (d) Find the horizontal or oblique asymptote, if there is one.
2. Solve the inequality  $\frac{x+4}{x-2} \leq 1$ .

**Solution:**

- 1.
  - (a) the domain is all  $x$  except  $x = \pm 1$
  - (b) the  $x$ -intercept is at  $x = 0$
  - (c) the vertical asymptotes are  $x = \pm 1$
  - (d) the horizontal asymptote is  $y = 0$  (the degree of the numerator is less than the degree of the denominator)
- 2. Solving the inequality, we have:

$$\begin{aligned}\frac{x+4}{x-2} &\leq 1 \\ \frac{x+4}{x-2} - 1 &\leq 0 \\ \frac{x+4 - (x-2)}{x-2} &\leq 0 \\ \frac{6}{x-2} &\leq 0\end{aligned}$$

Using the fact that the zero of the denominator of  $f(x) = \frac{6}{x-2}$  is  $x = 2$ , we set up the following table:

<b>Interval</b>	$(-\infty, 2)$	$(2, \infty)$
<b>Number Chosen</b>	0	3
<b>Value of <math>f</math></b>	$f(0) = -3$	$f(3) = 6$
<b>Location of graph</b>	below $x$ -axis	above $x$ -axis

Since  $f(x) \leq 0$ , the solution is  $x < 2$ .