MATH 133 – Calculus with Fundamentals 1
Sample Questions for Exam 1
September 12, 2017

I. Express the set of x satisfying $|2x - 5| < 1$ as an interval or union of intervals.

II. The following table contains values for three different functions: $f(x), g(x), h(x)$.

x	0	0.1	0.2	0.3	0.4
$f(x)$	-4.2	-5.9	-7.6	-9.3	-11.0
$g(x)$	10	20	40	80	160
$h(x)$	4	2.3	1.5	2.1	6.1

  A) (10) One of these is a linear function. Explain how you can tell which one it is, and give a formula for it.

  B) (10) One of these functions is *neither linear nor exponential*. Explain which one that is and why.

III.

  A) Complete the square in the quadratic function $f(x) = 3x^2 + 12x + 21$.

  B) What is the minimum value attained by the function $f(x)$.

  C) Using your answer from part A), sketch the graph $y = 3x^2 + 12x + 21$.

IV. You start at $x = 0$ at time $t = 0$ (hours) and drive along the x-axis (x values in miles) at 40 miles an hour for 2 hours. At $t = 2$ you stop for one hour. Then starting at $t = 3$, you retrace your earlier path and return to your starting position at 80 miles per hour.

  A) Sketch the graph of your position as a function of time.

  B) Give (piecewise) formulas for your function on the appropriate t-intervals.

V.

  A) Express the domain of the function $f(x) = \frac{x}{x^2-1}$ as a union of intervals.

  B) Figure 1 on the back of this page shows the graph $y = \frac{x}{x^2-1}$. Based on this, what can you say about the range of $f(x)$?

  C) Does $f(x)$ have an inverse function? Why or why not?

VI.

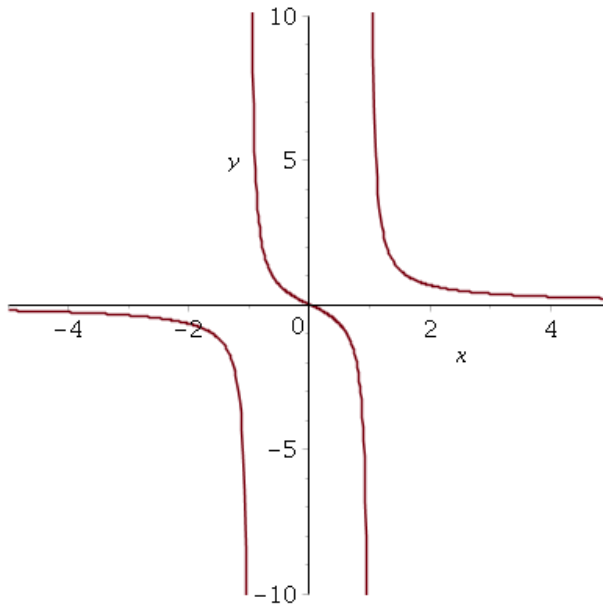 A) Sketch the graph of $y = 3\sin\left(\frac{x}{2}\right) + 2$ for $0 \le x \le 8\pi$.

Figure 1: Figure for Question V

B) What are the *amplitude* and *period* of this sinusoidal function?

VII.

A) Simplify: $\log_3(27) + \ln(e^{-3})$.

B) The population of a city (in millions) at time t (years) is $P(t) = 2.4e^{0.06t}$. What is the population at $t = 0$? When will the population reach 4 million?