

MATH 1310 - 009 — Midterm 1 Name: _____

Date: 09/08/2017

Instructor: Ethan Levien

No phones, calculators, or notes! Remember to show all your work.

1. (20 points) (**Limits**) Compute the following limits, or explain why the limit does not exist.

(a) $\lim_{x \rightarrow 7} \frac{|x - 7|}{x - 7}$.

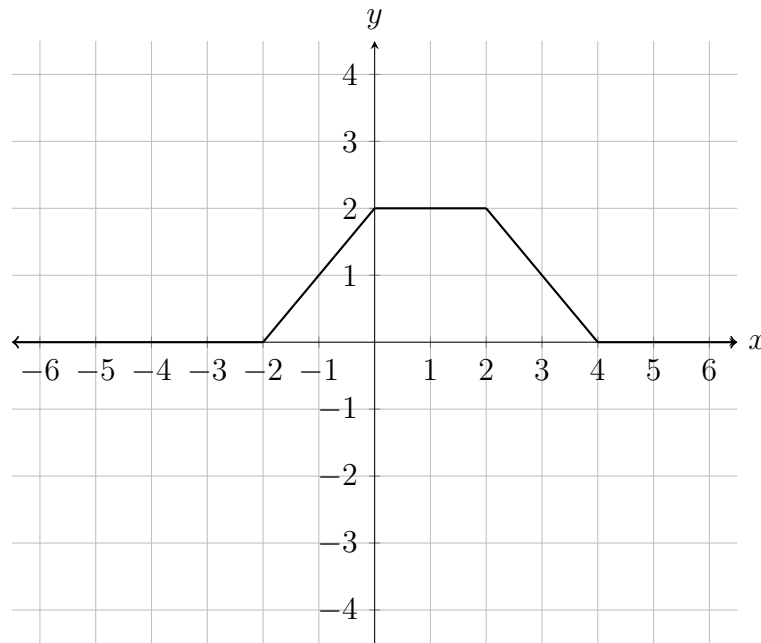
(b) $\lim_{x \rightarrow -2} \frac{x^2 + x - 2}{x^2 - 4}$.

(c) $\lim_{x \rightarrow \infty} \frac{x^2 + \sqrt{x}}{2x^2 - 2}$

2. (20 points) (**Function transformation**). Consider the function $f(x)$ depicted in the graph. Draw a graph of the transformed function

$$-2f(x + 1)$$

on the same axes.



3. (20 points) (**Slope**) Find the equation $y = mx + b$ for the secant line of the function $f(x) = x^2 + x - 1$ that passes between points $x = 0$ and $x = 1$.

4. (20 points) (**Finding the inverse**) Consider

$$f(x) = y = \ln\left(\frac{x}{x-3}\right).$$

(a) Determine f^{-1} .

(b) Find the domain of $f(x)$.

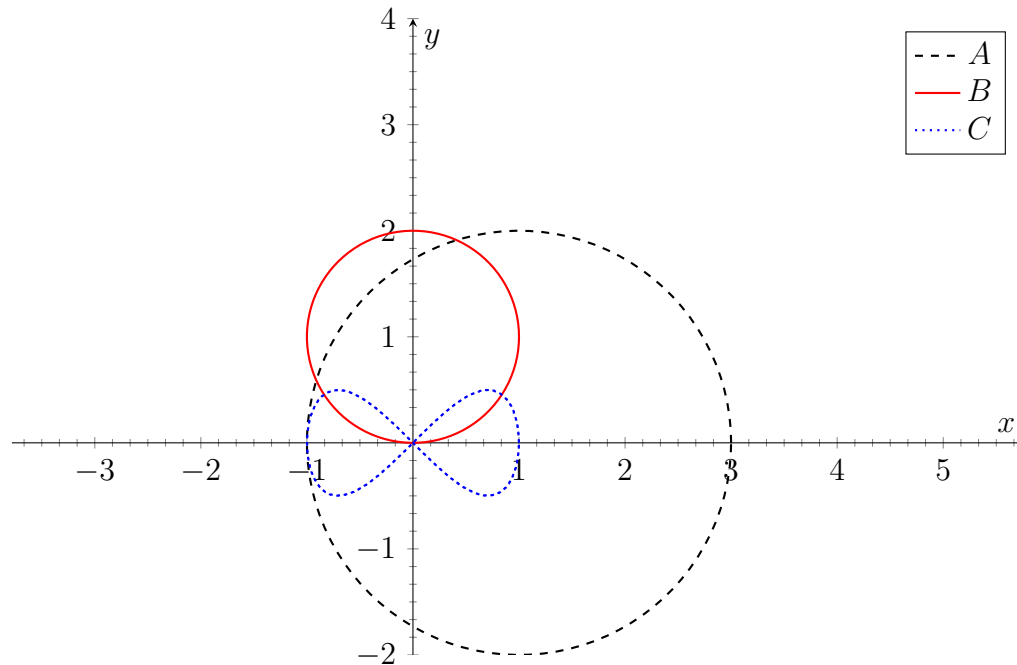
5. (20 points) (**Parametric equations**) Consider the parametric equations

(a) $x = 2 \cos(t) + 1, \quad y = 2 \sin(t)$

(b) $x = \cos(2t), \quad y = \frac{1}{2} \sin(4t)$

(c) $x = \cos(t), \quad y = \sin(t) + 1$

where $0 \leq t \leq 2\pi$. Match each of them with the corresponding curve in the figure below. Explain your choice.



6. (20 points) (**Domain and range**) Specify the domain and range of

$$f(x) = \frac{1}{4} \ln(3^2 - x^2).$$

You may express the solution in terms of the natural log of an integer.