Math 01B: Quiz 4

3 May 2024

Name: Answer Key

This is the fourth quiz. There are 10 questions. Each is worth 10 points, for a total of 100.

At the end of the quiz are 2 make-up question for quiz 3 and 1 make-up question for quiz 2. You do not have to do them if you are happy with your previous quiz grades. If you do any of make-up questions, I'll grade them and use them to replace your lowest-scored questions from the corresponding quiz.

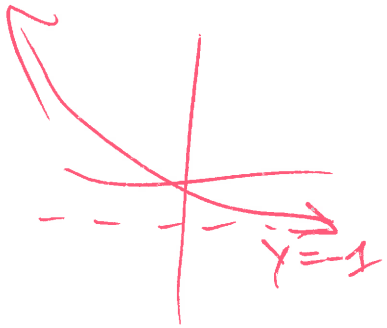
Carefully read each question and understand what is being asked before you start to solve the problem. Please show your work in an orderly fashion, and circle or mark in some way your final answers.

No calculators nor other electronic devices are allowed.

When you are finished, turn in both your exam and your index card with notes.

1		6	
2		7	
3		8	
4		9	
5		10	

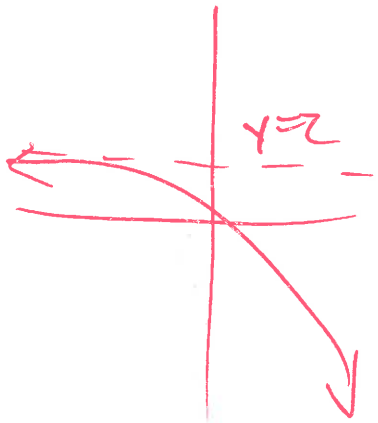
1. Sketch a graph of $y = (0.3)^{2x} - 1$, idenitfying the asymptote. What are the domain and range?



dom all real #s

ran $y > -1$

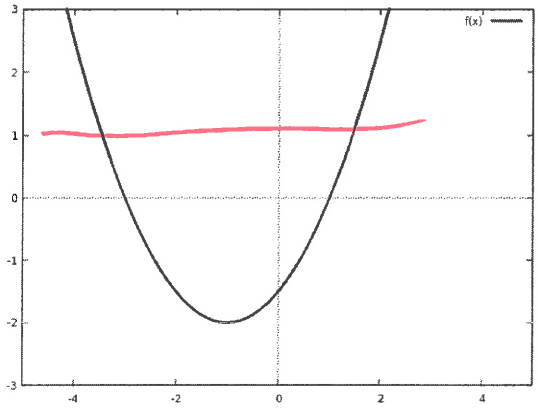
2. Sketch a graph of $y = 2 - 2^{2+x}$, idenitfying the asymptote. What are the domain and range?



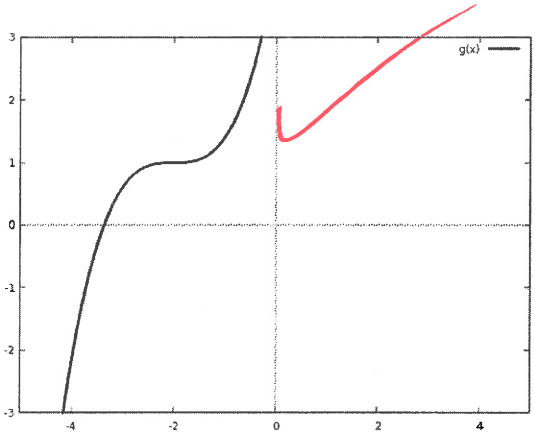
dom all real #s

ran $y < 2$

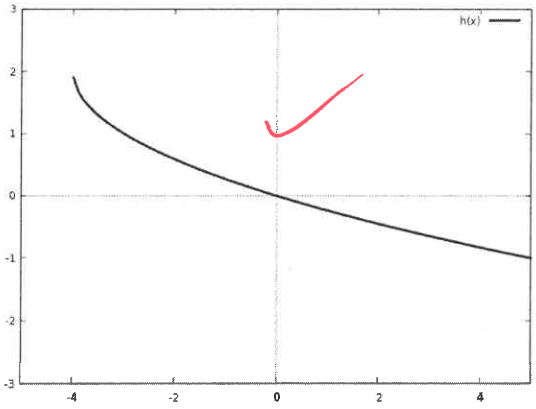
3. For each of the following functions, say whether it is one-to-one. Explain your answers.



Not 1-to-1: fails Horizontal Line Test



1-to-1: passes HLT



1-to-1: passes HLT

4. **Fully simplify the following expression. Your final answer should have no negative exponents.**

$$\frac{x^{-4}y^2}{3z^{-2}}$$

$\frac{y^2z^2}{3x^4}$

5. **Fully simplify the following expression. Your final answer should have no negative exponents.**

$$\frac{(3x)^3xy^{-2}}{3^3(xy^3)^2}$$

$\frac{3^3x^3x}{3^3x^2y^6y^2} = \frac{x^4}{x^2y^8} = \frac{x^2}{y^8}$

6. **Fully simplify the following expression. Your final answer should have no fractional exponents.**

$$\frac{(2^2x)^{1/2}y}{y^2z^{3/2}}$$

$\frac{2x^{1/2}y}{x^2z^{3/2}} = \frac{2x^{1/2}}{yz^{3/2}} = \frac{2\sqrt{x}}{y\sqrt{z^3}}$

7. Solve

$$10^{2x-4} = 1,000,000.$$

$10^{2x-4} = 10^6$

$2x-4=6$

$2x=10$

$x=5$

8. Solve

$$3^{1-x} = 3^{2x-2}.$$

$1-x=2x-2$

$3x=3$

$x=1$

9. Solve the following equation. [Hint: $36 = 6^2$ and $216 = 6^3$.]

$$36^x = 216^{5-x}$$

$(6^2)^x=(6^3)^{5-x}$

$6^{2x}=6^{15-3x}$

$2x=15-3x$

$5x=15$

$x=3$

10. The following equation describes a population of frogs over time:

$$F(t) = 100 \times (1.1)^t,$$

where $F(t)$ is the number of frogs at t weeks after the start date. Determine:

- The initial population; 100
- Whether this is exponential growth or exponential decay;
- The rate of growth/decay; and $0.1 = 10\%$
- The population after 2 weeks.

$F(2) = 100 \cdot (1.1)^2 = 100 \cdot (1.21)$

$= 121$ Frogs

5. **Extra credit (up to +5):** Consider the function $y = (-1)^x$. What are the domain and range? Explain your answers.

range: $y = \pm 1$. $(-1)^{\text{even \#}} = 1$

$(-1)^{\text{odd \#}} = -1$

Domain: only when x is a rational number $\frac{n}{d}$ where the denominator is odd.

because even denom is an even power root, and these are undefined for negative #s:

Eg. $(-1)^{1/2} = \sqrt{-1}$ is undefined

Quiz 2 make-up question

1	

1. Solve the following equation by completing the square. You will not get points if you use another method.

$$x^2 - 2x = 8$$

$x^2 - 2x + 1 = 8 + 1$

$(x-1)^2 = 9$

$x - 1 = \pm 3$

$x = 1 \pm 3$

$x = -2, 4$

Quiz 3 make-up questions

1		2	

1. What is the domain of $y = \sqrt{4 + 2x}$?

$4 + 2x \geq 0$

$2x \geq -4$

$x \geq -2$

2. Find the inverse of $f(x) = 3x - 6$.

$x = 3y - 6$

$x + 6 = 3y$

$\frac{x}{3} + 2 = y$

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

(Extra space. Label which question the work is for.)