

Math 1271 Quiz 1

January 30, 2014

Name: SOLUTIONS

TA: _____

NO CALCULATORS. NO HANDHELD DEVICES. NO BOOKS OR REFERENCE MATERIALS OF ANY KIND.

Time allowed: 20 minutes; Grader: Ashley Earls. Good luck!

1. (a) (15 points) Find the domain of $f(x) = \ln(e^x - 3)$.

$$e^x - 3 > 0$$

$$e^x > 3$$

$$\text{domain of } f(x): x > \ln 3$$

$$\text{domain of } f: (\ln 3, \infty)$$

- (b) (20 points) Find $f^{-1}(x)$ and state its domain.

$$x = \ln(e^y - 3)$$

$$e^x = e^y - 3$$

$$e^x + 3 = e^y$$

$$\ln(e^x + 3) = y$$

$$f^{-1}(x) = \ln(e^x + 3)$$

$$e^x + 3 > 0$$

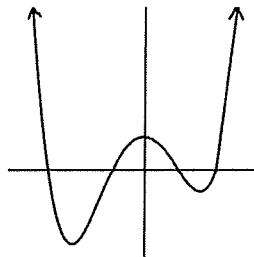
$$e^x > -3$$

$$\forall x \in \mathbb{R}, e^x > 0 > -3$$

$$\text{domain of } f^{-1}(x): \text{all real } x$$

$$\text{domain of } f^{-1}: \mathbb{R} = (-\infty, \infty)$$

2. (15 points, no partial credit) Below is the graph of a function f with domain \mathbb{R} and target \mathbb{R} .



Pick the correct statement.

- (a) f is both one-to-one and onto.
- (b) f is one-to-one but not onto.
- (c) f is onto but not one-to-one.
- (d) f is neither one-to-one nor onto.

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.

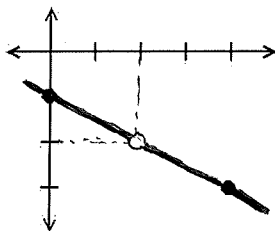
3. (15 points, no partial credit) True or false? If $h(x) = (x+1)(x^2 - 3x + 4)$, then $x = -1$ is a root of $h(x)$ of multiplicity 1.

$$\left[x^2 - 3x + 4 \right]_{x \rightarrow -1} = 1 + 3 + 4 = 8 \neq 0$$

True

4. Let $f(x) = \left[-\frac{1}{2}x - 1 \right] \left[\frac{x-2}{x-2} \right]$.

- (a) (15 points) Sketch a graph of f that includes the points $(0, -1)$ and $(4, -3)$.



- (b) (20 points) Find the largest δ such that

$$0 < |x - 2| < \delta \Rightarrow |f(x) + 2| < 0.4 .$$

$$\delta = \frac{0.4}{|-1/2|} = \frac{0.4}{1/2} = 0.8$$

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.