Math 1140F - Exam 4

Name: _____

Monday, October 6, 2014
Time: 50 minutes
Instructor: Brittany Cuchta

Instructions:

- Do not open the exam until I say you may.
- All cell phones and other electronic noisemaking devices must be turned off or completely silenced (i.e., not on vibrate) for the duration of the exam.
- **No calculators** are allowed on the exam.
- The exam *must* be taken in pencil. Using a pen on the exam will result in the loss of points.
- Failure to follow directions specific to a problem will result in the loss of points.
- Circle or box your final answer where appropriate. Put your final answer in the provided space when available. Failure to do so will result in points being deducted.
- Show **all** work. Full credit will only be given if work is shown which **fully and clearly** justifies your answer. I reserve the right to not grade a problem which I cannot read.
- Answers must be exact (like $\sqrt{2}$), not approximate (like 1.414), unless a problem specifically indicates otherwise.
- All final answers must be simplified unless otherwise specified. **Rationalization is not required unless otherwise specified.**
- If you run out of room, use the back of the page and indicate this on the question.
- As always, you are expected to exhibit academic integrity during the exam.

Page:	1	Total
Points:	100	100
Score:		

1. (10 points) If $f(x) = \dfrac{x}{x+3}$ and $g(x) = \dfrac{27}{x+1}$, find $(f \circ g)(2)$. Give the domain of $(f \circ g)(x)$ in set notation.

$(f \circ g)(2) =$ _____

Domain of $(f \circ g)(x)$: _____

2. (4 points) Give f and g such that $(f \circ g)(x) = H(x)$.

$$H(x) = \frac{1}{\sqrt{6x+6}}$$

$f(x) =$_____

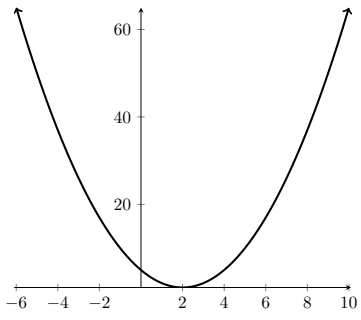
$g(x) =$_____

3. Are the following functions one-to-one?

   (a) (2 points) $\{(1,3),(2,4),(-2,3),(4,2)\}$

   Circle One: Yes No

   (b) (2 points)



   Circle One: Yes No

4. (11 points) Find the inverse of the following function. Be sure to **check your answer**. Failure to show a check of your solution will result in points being lost. Also state the domain and range **of the inverse function** in set notation.

$$f(x) = \frac{x^2 + 3}{3x^2}, \quad x > 0$$

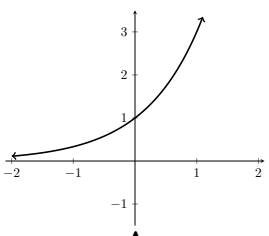
Inverse: _____

Domain: _____

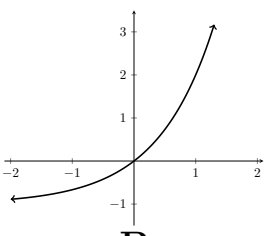
Range: _____

5. (4 points) The equation of an exponential function is given. Select the graph that best represents the function. Clearly circle your answer.

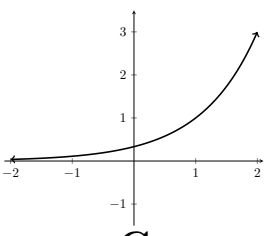
$$f(x) = 3^{x-1}$$



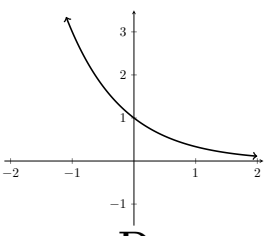
A



B



C



D

6. Solve the following equations. Express **all** powers as factors in logarithms.

(a) (6 points) $3^{x^3} = 9^x$

Solution: _____

(b) (8 points) $e^{-2x} = \dfrac{1}{3}$

Solution: _____

(c) (10 points) $\log_3(x^3 + 1) = 2$

Solution: _____

7. Solve the following equations.

(a) (12 points) $\log x + \log(x - 21) = 2$

Solution: _____

(b) (10 points) $2^{2x} + 2^x - 12 = 0$

Solution: _____

8. (6 points) If $\ln 2 = a$ and $\ln 3 = b$, express $\ln \sqrt[5]{6}$ in terms of a and b

Solution: _____

9. (4 points) Write the following expression as a single logarithm.

$$\log \frac{1}{x} - \log \frac{1}{x^2}$$

10. (5 points) Write the following expression as a sum and difference of logarithms. Express powers as factors. All polynomials which appear must be factored *completely*.

$$\log \frac{\sqrt[3]{x^2+1}}{x^2-1}$$

11. (6 points) Given the following function, graph the inverse on the same grid.