

Instructor: Ann Clifton

Name: _____

Copy and answer each of the following questions in order on your own paper.

Please make sure your work is in order and written clearly and neatly. Once you have completed the exam, use a scanning app to create a PDF file then upload the file to Canvas.

I have written the exam with a 50 minute class period in mind but you will have 3.5 hours. This exam is open notes and open book. I ask that you work independently since the purpose of this assessment is to demonstrate *your* mastery of the material. If you experience technical difficulties, please notify me ASAP.

Take your time. Good luck!

True or False. Justify your answer by showing work or providing an example, definition, or graph.

1. The domain of an exponential function of the form $y = Ca^x$ is all real numbers or $(-\infty, \infty)$.
2. The range of a logarithmic function $y = \log_a(x)$ is all real numbers or $(-\infty, \infty)$.
3. The formula $A(t) = Pe^{rt}$ gives the amount in an account after t years with an interest rate of r compounded *annually*.
4. The function $f(x) = \frac{1}{x}$ is one-to-one.
5. If $f^{-1}(x)$ is the inverse function of $f(x)$, then $(f^{-1} \circ f)(x) = (f \circ f^{-1})(x) = 0$.
6. If $f^{-1}(x)$ is the inverse function of $f(x)$ and $f^{-1}(7) = 4$, then $f(4) = 7$.

Short Answer. Show all work to receive full credit.

7. The function $f(x) = \frac{3-x}{2x+1}$ is one-to-one. Find $f^{-1}(x)$.
8. Let $f(x) = \sqrt[3]{x-1}$ and $g(x) = x^3 + 1$.
 - (a) Find $(f \circ g)(x)$ and state the domain.
 - (b) Find $(g \circ f)(x)$ and state the domain.
 - (c) Based on your answers to parts (a) and (b), are these two functions inverses of each other? Why or why not?
9. Write the expression as a sum and/or difference of logarithms.

$$\log \left[\frac{x^2(x+2)}{x-3} \right]$$

10. Write the expression as a single logarithm.

$$\ln(x) - \ln(y) - 2\ln(z)$$